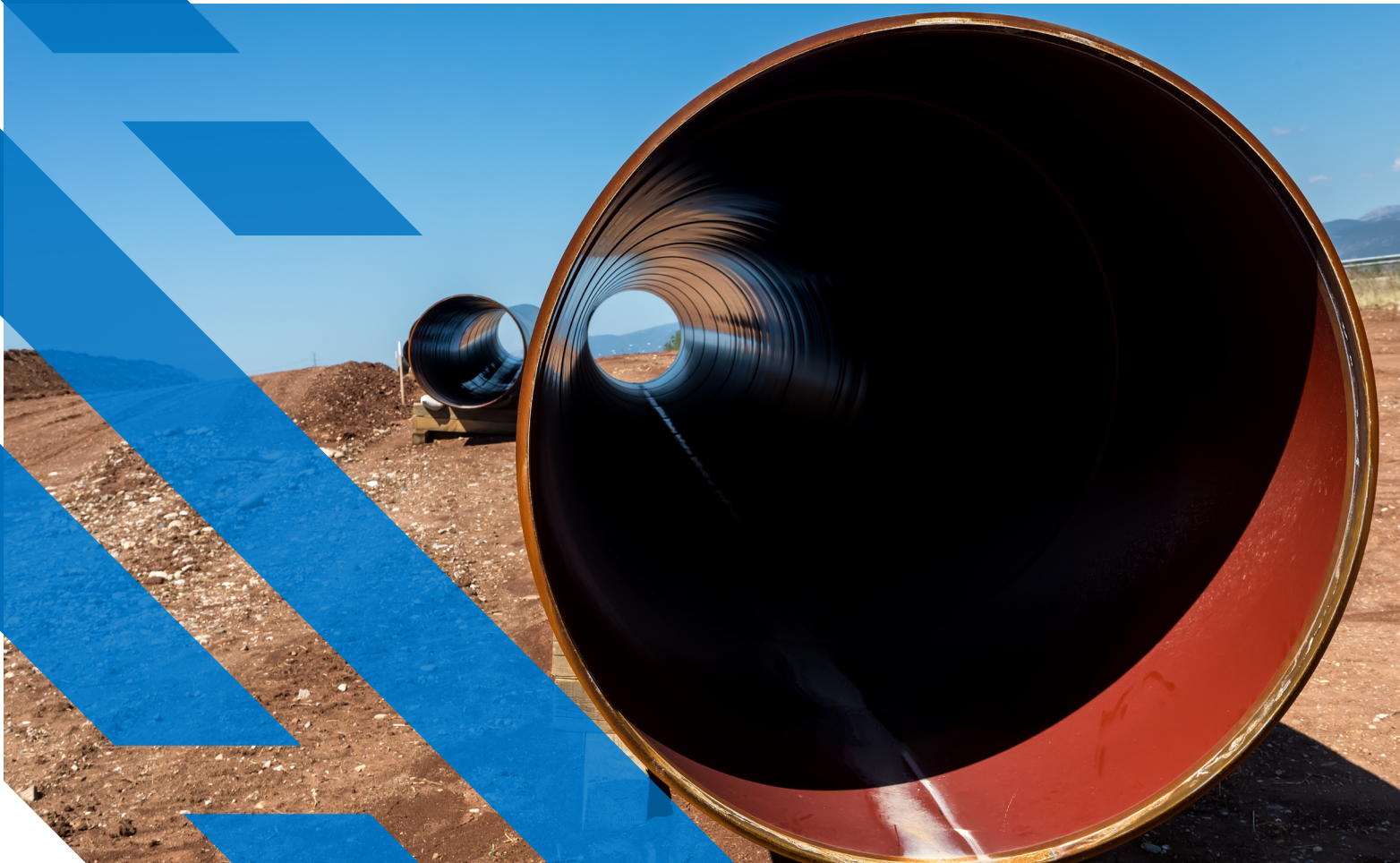


WHITE PAPER / **NATURAL GAS PIPELINE EPC PROJECT DELIVERY METHODS**

EXPLORING EPC PARTNERED PLANNING BENEFITS FOR PIPELINE PROJECTS

BY **David Hanks, PE, P.Eng** AND **Paul (PJ) Kolnik, PE**

As pipeline project activity intensifies and capital spend increases, pipeline owners need an execution process they can trust. EPC partnered planning provides owners with the critical upfront planning, estimating and design to increase project efficiency and drive successful project outcomes.



INTRODUCTION

With almost 3 million miles of existing gas and liquid pipelines traversing the country and strong growth expected throughout North America for natural gas pipeline construction, according to North American Oil & Gas Pipelines, pipeline project activity is on the rise. Infrastructure improvements, maintenance, new pipelines and gas processing facilities are ideal project candidates that can benefit from the partnered planning process.

Progressive engineer-procure-construct (EPC) models that use upfront partnered planning can help improve outcome certainty in an era of increasingly challenging requirements.

DRIVING PIPELINE PROJECT EFFICIENCY

As pipeline projects grow larger and capital spend increases, owners encounter many new challenges. With a desire to leverage existing resources and avoid costly hiring, owners want to secure the right design, supply and construction knowledge to see that projects are developed to the highest standards. Owners also want to maintain team continuity and commitment throughout the entire process to increase efficiency while still being involved in key project decisions. Projects also must address challenging timelines that can be influenced by permitting, regulatory hurdles, environmental concerns, land and right-of-way acquisition issues and procurement lead times. On the financial side, owners seek definitive pricing or reliable estimates to secure project financing or funding with transparency of costs for a cost-efficient project.

To meet the unique demands of large projects, EPC project delivery can be a great solution. EPC handles

overall responsibility of a project in a single package, while also performing complementary services such as studies, permitting and right-of-way (ROW).

With an integrated EPC contractor, project design can be completed with an overlap of procurement and construction to expedite the schedule and meet critical project timeframes. Staff can be leveraged by being in a review and oversight mode instead of managing the daily interactions required between the different project interfaces. The EPC contractor takes on and reduces the overall project risk by managing these interfaces.

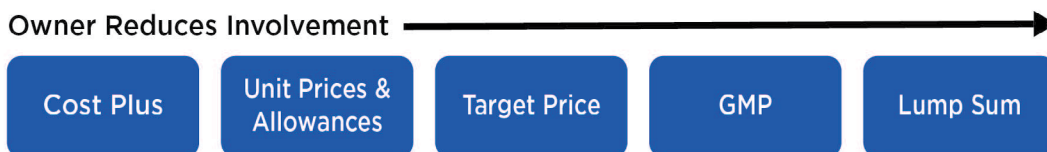
IMPROVED EPC PARTNERSHIPS

Some typical challenges of EPC project delivery often will deter a pipeline owner from selecting this delivery method. These challenges include a complicated RFP process, a feeling of loss of control over the process or lack of details in the early stages of a project that can lead to changes. While using the EPC method can offset many of these potential issues, pipeline owners may be hesitant to ask an external contractor to own the majority of the project EPC tasks. Limiting risk is a top priority and owners may not feel comfortable relying on external voices to provide the clarity and assurances needed.

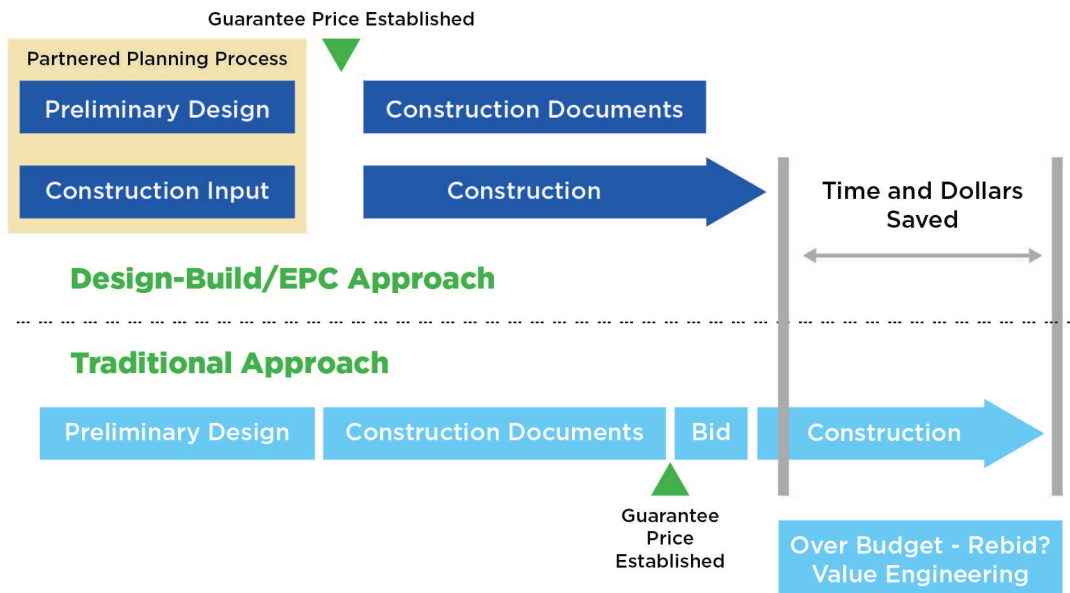
A great solution to this is EPC partnered planning. Partnered planning is similar to front-end planning (FEP) — the process of developing sufficient strategic information with which owners can address risk and make decisions to commit resources in order to maximize the potential for a successful project, as defined by the Construction Industry Institute (CII) — and is often used in the oil and gas industry on large processing and refining facilities. While there

POTENTIAL EPC CONTRACT MODELS

Partnered planning identifies, transfers and reduces risk early for pipeline operators — no matter the EPC model.



Negotiated EPC With a Guaranteed Price Established



are many similarities between the two, partnered planning is becoming the next variation of preparing for EPC for areas of the industry that may not be familiar with a design-build project delivery method.

There is a direct correlation between effective planning and predictable project success (scope, schedule, budget). Partnered planning can be used as a “stage and gate” process to gain stakeholder alignment where decision points are identified at critical stages, such as financing and funding, or regulatory approvals and customer commitments, before proceeding. The owner can be involved in key decisions and work with the EPC contractor to determine the technical and commercial impact of project decisions before fully committing.

Upfront partnered planning can quickly identify and reduce risk, even if a pipeline project is undefined, with a very preliminary or extremely complex scope. Owners can rest easy that project success is achievable when incorporating comprehensive, innovative, upfront project planning. Partnered planning aligns incentives for both the operator and EPC contractor from the very beginning, allowing for a collaborative and teamed approach

for overcoming each project’s unique challenges. While gas pipeline projects, especially within the regulated utility industry, rely on cost transparency, capital spend targets and prudence, at-risk developers may not be motivated in the same way. Developers may have limited staff to manage a partnered planning effort or may even want to have a solid lump sum bid from the very beginning for project financing purposes.

Whatever the motivations of the project owner, EPC is a flexible contracting model that can incorporate partnered planning with as much or as little cost transparency desired.

LEVERAGING ALL EPC HAS TO OFFER

For pipeline projects, EPC can deliver design, procurement and construction services, including providing all interfaces between engineering, vendors and construction teams. The approach offers great leverage of resources to access knowledge, cross-industry experience, project management, safety and quality control.

Traditional design-bid-build approaches work to define the scope, execution details and budget in a linear

way before establishing a reliable cost and schedule. But, as many projects have an undefined scope from the start, partnered planning provides the critical upfront estimating and design needed to streamline efforts and drive successful project execution.

UNPACKING THE PARTNERED PLANNING PROCESS

Scope definition lies at the heart of strong project execution. For pipeline projects, the partnered planning process establishes the groundwork for moving through project scoping and preliminary design while familiarizing owners with future work breakdowns, schedules and the EPC process.

The partnered planning process is undertaken at the outset of a project and, along with pipeline or utility project managers, involves access to critical stakeholders, including technical and engineering teams and maintenance and operations personnel. Buy-in from internal and external stakeholders to understand needs is another essential component of the process.

A range of advantages can be realized during the partnered planning process:

- Pipeline owner and EPC contractor can be mutually engaged in key scoping and project execution decisions.
- Transparency of EPC processes can be provided during the planning stage.
- The pipeline owner can influence the timing of cost outlays.
- Project scope and standards are jointly developed with input from industry leaders at both utility and EPC.
- Planning and design are undertaken early in the process, which results in improved schedules and opens the door for value engineering and execution efficiency.
- Partnered planning enables the highest level of cooperation and planning for success, including uncovering and helping the team to more fully understand the potential risks.

- All equipment, materials, construction bids, schedule, execution and stakeholder buy-in are identified and the effect on risks identified.
- Early buy-in from stakeholders minimizes rework and impact from preference changes.

In addition to providing the clarity needed for successful project execution outcomes, a planned and partnered EPC approach also identifies and helps manage risk.

WRANGLING RISK

Pipeline project risk comes in many forms. The partnered planning process leads the way to secure greater certainty in project costs while providing the transparency needed for the overall project.

CONSTRUCTION COSTS

Because extensive planning and preliminary design are undertaken at the outset, construction contractors, all materials and equipment can be competitively bid early on by agreed-upon suppliers. This early insight provides essential risk management benefits for the overall effort:

- As more than 90% of the project cost is obtained through a competitive bid process, value suppliers and subcontractors can be selected.
- Through extensive discussion and review, the bid process uses existing operator standards or new bid and subcontractor standards can be defined during the planning stage.
- With clearly defined specifications, the project can leverage existing supplier and subcontractor relationships and incorporate approved suppliers and vendors where appropriate.
- As a team, supplier and subcontractor bids can be mutually solicited and evaluated.
- Active engagement among key team members and stakeholders for broad understanding and visibility of the EPC pricing process.

TOTAL TRANSPARENCY IS AVAILABLE

The partnered planning process provides a particular advantage for owners seeking price certainty through an integrated EPC model. Full transparency into supplier and subcontractor selection and price

development based on the following approach:

- EPC professional services during the planning phase and subsequent phases are priced using agreed-upon labor rate sheets.
- Subcontractor construction price uses subcontractor labor and equipment rates plus an identified EPC fee.
- Engineered materials and equipment are procured at suppliers cost plus identified EPC fee.
- Visibility into the pricing for all major areas provides additional certainty for projects not clearly defined at the start and changes are easier to manage during execution.

THE VALUE OF SECURED OWNER INVOLVEMENT

For a chance of success in the EPC partnered planning approach, owner support of the process is key.

A cohesive team can create a structure that supports the overall goals and all parts of the project, not just individual areas of work. Team members may be empowered differently than a typical project and owners should select individuals that have the ability and time to support the project from pre-scoping through commissioning. If team members join late or there is team turnover, then the ability to influence the project will be limited and possibly disruptive or costly.

All stakeholders should be involved in the preliminary stages of the project to deliver a comprehensive approach. These stakeholders include engineering, planning, sourcing, permitting, environmental, land rights, construction, operations

PLANNING GOALS

Scoping a pipeline project rests on productive in-person meetings that identify stakeholders and owners while critically evaluating and communicating the immediate and long-term pipeline operating requirements. Even before committing to a specific EPC approach, partnered planning will uncover:

- Equipment and material pricing
- Potential subcontractors
- Project schedule
- Project execution strategy
- Risk analysis
- Internal and external stakeholders

and maintenance personnel. External partners or customers impacted by the project, other utilities or landowners with shared ROW and any necessary permitting, environmental and other government agencies should also be engaged to reduce the likelihood of impacts later on in the project. Through active participation, the owner can influence the overall team structure and can also leverage external relationships with suppliers, agencies and partners to impact the overall success of the project.

EPC Benefits Scale with Project Magnitude



In Situ Pipeline Repair



Gas Processing Facilities



RELIABLE PROJECT OUTCOMES

Partnered planning thrives in otherwise less-than-ideal pipeline project scenarios. Whether the project scope is uncertain, technically complex, or the resources or execution bandwidth is not available, partnered planning combined with a tailored EPC approach is invaluable.

While EPC contractors may tout a detailed planning approach, owners should carefully examine the motivation for the methodology. EPC contractors that have a proven track record will bring forward the most robust process and the most reliable outcomes.

BIOGRAPHIES

DAVID HANKS, PE, P.ENG, is a project director in the Transmission & Distribution Group at Burns & McDonnell. David has cultivated experience managing large substation and transmission line EPC projects in the U.S. and Canada. His responsibilities include business development, pursuits, project execution, staffing, training development and process development for EPC delivery of transmission and distribution projects. David is a registered professional engineer in Kansas, New Hampshire, Utah, Alberta, Manitoba, Newfoundland and Labrador, and Saskatchewan.

PAUL (PJ) KOLNIK, PE, is a business development manager in the Transmission & Distribution Group at Burns & McDonnell. PJ has a unique interest in client needs and challenges surrounding the design and construction of major capital projects. He regularly meets with natural gas utility operators to strategically plan and address natural gas project needs across the country.

ABOUT BURNS & McDONNELL



Burns & McDonnell is a family of companies bringing together an unmatched team of engineers, construction professionals, architects, planners, technologists and scientists to design and build our critical infrastructure. With an integrated construction and design mindset, we offer full-service capabilities with offices, globally. Founded in 1898, Burns & McDonnell is a 100% employee-owned company and proud to be on *Fortune's* list of 100 Best Companies to Work For. For more information, visit burnsmcd.com.