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Establishing EPC Contracts Suitable for Today's Sustainable Infrastructure Projects

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INTRODUCTION

Engineering, procurement, and construction management (EPC) firms continue to recognize substantial losses due to an inherent risk imbalance that has become impossible to ignore, forcing many to exit fixed-price work. The fixed-price EPC contract is slowly dying. Yet, the investment community continues to mandate fixed-price turnkey contracts to govern project execution.

This is the EPC turn-key paradox.

Which begs the question: Are we headed toward an EPC contract reckoning?

THE STATE OF THE EPC INDUSTRY

Managing an EPC business is incredibly complicated. In addition to the considerable competition, a never-ending battle for skilled labor, and constantly evolving market trends, there is the daunting task of managing complex staffing profiles. The EPC industry is all about back log.

Without visibility of meaningful work in the future, it is nearly impossible to retain critical staff that maintains the intellectual knowledge and know-how necessary to execute intricate projects. People execute projects. Thus, people are the only true competitive differentiator an EPC firm has to offer. Demonstrating you have executed 25 projects in a particular vertical means far less if all the resources involved no longer work for the company.

This is where things get sticky. EPC companies cannot afford to let go of incredibly hard-to-replace resources. But at the same time, they cannot afford to keep them on the balance sheet if there are large gaps between projects or a lull in the project backlog.

The result?

EPC firms do whatever it takes to book work to retain the human capital required to properly execute projects, and more importantly, continue to secure contracts. The alternative is not pleasant. Letting go of resources that will likely move to a competitor all but guarantees a decline in growth.

Yet, doing what it takes to book work typically means signing contracts that carry far too much risk, agreeing to prices that require flawless execution, and taking on unjustified (pending your vantage point) liabilities. This is the definition of "kicking the can." Signing poor contracts will hold you over for a while, but eventually those projects near completion, and the ugliness ensues. In some respects, EPC industry participants are in a long-term race to the bottom.

Unfortunately, the evidence is overwhelming that the EPC industry is suffering from this paradox. According to a survey conducted by McKinsey & Company in 2020, senior project executives reported that projects exceed their budgets and schedules by 30-45%.

Over the seven-plus years that Nexus PMG has been in business, we have assessed hundreds of projects. Of those, I can count the number of projects that were not fixed price on one hand. So, if most projects are over budget and behind schedule by 30-45%, who do you think is bearing much of that burden?

Is Fixed Price the Cause or Effect?

One could argue that the commonplace budget and schedule overruns are the precise reason why a fixed price contract is preferred and near required by the investor community. Why would a project sponsor want to take on that kind of expected risk?

To answer that, we must dig a little deeper.

First, let's start with the most common reasons why projects end up so far over budget and behind schedule. This topic is subject to significant debate, with several thousand articles addressing the matter spanning decades. Most of the articles speak to very real issues such as poor and ineffective communication, delayed or insufficient engineering, inadequate estimating, ineffective scheduling, poor commissioning practices, and skilled labor constraints.

However, I tend to believe those factors have one overarching aspect that triggers them: governance.

Simply put, the EPC contract structure determines the level of collaboration on a project. In a fixed price turn-key environment, the EPC firm has agreed to take on the majority of project execution risk and is now invested in doing whatever it takes to achieve or exceed as-sold margins for shareholders (this is exacerbated for publicly traded EPCs). It immediately leads to a "stay out of my way" mentality for the EPC company.

Conversely, owner teams do not want to offer up any excuse that could lead to a justified claim, so they too end up being very procedural and transactional leading to a "just get your job done" mentality, or risk getting change ordered.

This inevitably results in issues that cause delays and cost overruns.

- Open and honest communication comes second to protecting margins. Rather than addressing concerns as they materialize, a "we will course correct, so it is not worth addressing" mentality dominates. Risks ultimately materialize and the mitigation options that would have been viable are no longer a possibility and impacts are felt.

- Change orders or commercial disputes take far too long to resolve, resulting in schedule impacts arising from delayed decision making.

- Project management becomes an arrears function. In a fixed-price contracting environment, the amount of time project management spends satisfying internal reporting requirements is considerable. Executive management wants to know the precise status and risk profile of higher-risk projects. Surplus time spent satisfying internal requirements is time not spent looking out for the client.

- Owner teams and owner's engineers cannot deliver mutual support on risk mitigation strategies. For example, if an EPC firm is struggling to find a good specialty contract for an aspect of the job and the owner's engineer has a great connection to one that would be ideal, it is unlikely to be exploited. The potential liability of influencing the EPC firm ("well you told me to use them") must be considered and thus it is likely necessary to let the EPC find their own way. This likely results in schedule delays, cost overruns, and even poor-quality work.

- The EPC company is responsible for getting the plant to substantial completion and satisfying the performance tests. There is nothing wrong with this. However, in the age of less mature sustainable infrastructure projects, EPC companies are rarely qualified to commission and start-up such facilities. But you cannot have a plant performance guarantee (fixed-price or not) if the EPC firm does not take this work on. Startup and commissioning should be a highly coordinated team effort, bringing in the appropriate balance of experts, regardless of which stakeholder brings them to the table.

If I told you that I wanted to partner with you in pursuit of a major endeavor, and on day one of doing so we agreed that we must protect our respective interests, would that be a partnership you would sign up for? That is the natural environment that a fixed-price contract creates. An EPC company has a responsibility to its stakeholders to maximize profits, protect downside and reduce contractual liability and cost exposure. The owner team has the same responsibility.

Thus, unfortunately, there can only be one outcome when things do not go according to plan: cost overruns, schedule delays, and dispute resolution.

Shifting Project Execution Risk Mentality

Executing complex infrastructure projects is difficult. It requires proactive planning and intense project management. There are countless moving parts, and cohesive collaboration is arguably the single most important means to delivering a project on time and on budget.

The Nexus PMG team has been a part of thousands of projects. Most of them were fixed-price turnkey with performance guarantees. Most of them were over budget and behind schedule. That is the truth. I do not think this will come as a surprise to most reading this as it is a constant topic of conversation and frustration amongst investors, developers, contractors, and advisors.

So, why is this the status quo particularly in sustainable infrastructure sectors? Why do we keep doing things the same way if it is not working?

To answer that, we have to understand the investor mindset.

Project execution from the investor lens comes down to three things.

- Cost risk exposure
- Schedule delay exposure
- Plant performance exposure

All of these are a threat to returning their invested capital and achieving expected pro forma returns. Investors are not out to break even. However, most real-asset investors (general partners) are investing money on behalf of pension funds, insurance funds, large corporates, etc. It is much easier, if not required, to defend an investment into a project where, contractually, the risk is allocated to credit-worthy third parties.

If guarantees exist that cause contracted stakeholders significant pain if they fail, that is a good place to be.

Until it is not.

It is time to change the perception of project execution risk. This will require general partners to spend adequate time educating limited partners (and themselves) on the practical and inherent nature of project execution. Ultimately, it requires a significant mentality shift. One that results in establishing a more commonplace project execution structure that rationally decreases cost, schedule, and performance exposure. Paper-based de-risking is worth the value of the paper it's written on.

UNDERSTANDING THE EPC CONTRACT

As an infrastructure investor, you are responsible for putting capital to work with as much downside risk protection as possible (within the boundaries of the expected return profile). This means you spend much, if not most, of your time assessing risk. My guess is that you have personally experienced the pains of cost overruns and schedule delays resulting from EPC performance.

The hard truth is that a project that runs significantly over budget and behind schedule is far worse for the sponsors and investors than it is for the EPC company. EPC liabilities are capped at a modest percent of the contract value (often 20%). The sponsor liability is the balance of the investment (the remaining 80%).

Let's examine four influential components of the EPC contract and their influence over risk allocation.

- Price
- Contingency
- Performance guarantees
- Project schedule risk

Price

To understand cost risk, you must first understand how a proper EPC contract is priced.

1.) A Front-End Engineering & Design (FEED) package is completed, often utilizing the Front-End Loading (FEL) process. This process leverages a phase-gated approach to maturing project definition allowing for the ability to cut off development capital spending if it looks unlikely to reach technical or economic viability.

2.) During the progression of the FEL process, equipment package specifications are being defined and drafted to use as the basis to obtain pricing from equipment and technology vendors. Detail-oriented communication with such vendors is critical, regardless if sole-sourced or awarded via a bid process. Equipment costs typically make up 30-45% of the total project cost. Equipment costs prior to contract signing should be very accurate.

3.) At the completion of FEL 3, we typically say we have completed Basic Engineering. This means there is still lots of detailed engineering remaining to be ready for construction and have firm quantity take-offs, but there is enough work complete to determine if the project remains viable.

The engineering package typically has enough definition to complete some level material quantity takeoffs (remaining will typically be factored) and a reasonable assumption can be made for standard plant equipment such as electrical MCCs and standard pumps which will be finalized during the detailed engineering process. This is the process of "measuring" the number of bulk commodities that must be installed.

Price (Cont'd)

For example, measuring the number of cubic yards of concrete that need to be poured based on foundation design. Or the length of small-bore carbon steel pipe that must be installed.

By measuring quantities as accurately as one can at this phase, you define in reasonable detail the amount of material you need to complete the project. Once you know how much you must install, you can calculate the cost to purchase the material and the amount of labor that will be needed to install it. Material costs typically make up 25-35% of the total project cost. Material costs before contract signing should be modestly accurate, but where large assumptions are made, the appropriate amount of contingency should correlate.

4.) Once you have the quantity of pipe, cable, concrete, instruments, and other material you can estimate labor costs. There are several ways in which this is done, but the most common is by applying install unit rates. EPC companies maintain and retain access to a large amount of data. They know exactly how much time it takes a pipe fitter to install 2-inch small-bore carbon steel pipe by the linear foot. Thus, the only missing part of the equation is how much footage is there to install. Multiply the two and you get the number of man-hours required to do so. Assign a labor rate and you have the number of dollars required to do so. It all comes back to the ability to estimate quantities as accurately as possible.

Labor costs typically make up 20-35% of the total project cost. Labor costs risk is like material cost risk as both are heavily driven by the accuracy of the quantity calculations and regional trade agreements. Labor unit rates are typically well known by the contractor, and when allowing for necessary escalation, are modestly accurate.

Price (Cont'd)

5.) You also have subcontract considerations. Most EPC companies subcontract out a portion of their work. Many of them subcontract most if not all. The most common subcontracts are specialty trades or supply install equipment packages (vendor installed). An EPC company can execute entirely as a general contractor (GC), but the ability to self-perform is typically advantageous. Self-performed work is often completed by craft labor that maintains a history of working together which impacts performance.

6.) Last, but certainly not least, you have commissioning and startup considerations. This one is always a hot topic.

From the above, it is obvious to see that the amount of engineering definition, equipment vendor engagement, and effort put into generating material takeoffs drives estimate accuracy. If satisfactory engineering and project execution definition does not exist, capital cost estimate accuracy is inherently decreased which should serve as a major red flag. When done properly, an EPC pricing effort is an aggregate of producing material takeoffs (MTO's), completing labor studies, adequately negotiating major equipment packages, and defining the balance of plant cost risk. In other words, data-driven analysis, and assumptions.

Price (Cont'd)

The following table from the association for the advancement of cost engineering depicts the various classes of estimate and expected accuracy driven by the maturity of deliverables.

Estimate Class	Maturity Level of Deliverables	Methodology	Expected Accuracy Range
Class 5	0% to 2%	Capacity factored, parametric models, judgement, or analogy.	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Equipment factored or parametric models.	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Semi-detailed unit costs with assembly level line items.	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Detailed unit cost with forced detailed take-offs.	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Detailed unit cost with detailed take-offs.	L: -3% to -10% H: +3% to +15%

If you properly evaluate the process in which an EPC price was established, you can begin to understand how accurate the price likely is. That comfort level should significantly influence the decision-making regarding which commercial cost structure is preferred. If a rigorous pricing exercise is completed as described, is it fitting to execute a fixed price agreement that increases capital costs (EPC firms incorporate their own contingency) and assume all the noted downsides created by an inherently self-serving environment?

Contingency

Also impacting cost is the consideration of contingency. A cost contingency budget (which is different from schedule contingency) exists to cover uncertainty. To be clear, there will always be uncertainty and execution risk no matter the contract structure or the extent of project scoping. The key is to use best practice techniques to capture and quantify that uncertainty to establish the appropriate contingency budget.

There are two predominant forms of contingency:

Estimate Contingency

The contingency established by the amount of measured uncertainty within the detailed capital cost estimate. Were widely variable assumptions made to calculate electrical equipment costs? Was there a specific equipment package that was not quoted but rather taken from a similar project? Estimate contingency is often referred to as the "known unknowns."

Event Contingency

Often referred to as unknown unknowns, event contingency captures external influenced events. What happens if a selected equipment vendor goes bankrupt and the process to award a contract to an alternative vendor delays schedule? What if a pandemic occurs? Are you building in a union labor environment with a history of strikes?

Contingency (Cont'd)

HOW TO ASSESS CONTINGENCY REQUIREMENTS

There are several methods to assess contingency requirements. Unfortunately, the most common method is selecting a percent of the total cost based on similar projects or the estimated class. That can work in industries that are mature and where hundreds of similar facilities have been constructed (compressor stations, simple cycle power stations, solar farms). Even then, every project has its own risk profile. In sustainable infrastructure, that method is not suitable.

Arguably, the industry-standard method is to utilize a combination of quantitative and qualitative assessments.

Quantitative Assessment

A quantitative assessment makes use of probabilistic analysis techniques such as the Monte Carlo simulation method. The process requires building a logical model where risks are identified from a variety of sources, including the qualitative assessment. The model is subject to simulation through multiple iterations performed with a random activity duration selected from a predefined distribution.

Qualitative Assessment

A qualitative assessment is an evaluation that relies on the experience and knowledge of key project stakeholders to identify items that have the potential to impact the schedule and cost. This type of assessment is typically managed via the project risk management plan and risk register.

Contingency (Cont'd)

Risk Register

A risk register is exactly what it sounds like. It is a register of identified known unknowns and unknown unknowns. It is comprised of the following key components:

- Risk item
- Likely risk trigger
- Risk response plan
- Risk owner
- Estimated impact (cost and schedule)
- Probability of occurrence

Not only is this an extremely valuable tool to manage risk throughout the life of the project, but the information can be used to calculate contingency requirements.
By assigning a potential impact value and probability of occurrence, you can identify the potential cost and schedule impacts to a project.

Contingency (Cont'd)

Monte Carlo Simulation

Below is an example of a Monte Carlo-driven contingency analysis that measures contingency requirements at confidence levels in increments of 5%. For example, a P80% means that if you were to proceed with the amount of contingency recommended at that level, you have an 80% chance of completing the project with enough money. This makes logical sense if you presume that the more contingency you carry, the better chance you have of finishing the project without requiring more capital.

Table 1 - Calculated Contingency Output Values

Confidence Level	Estimate Value w/ Contingency	Contingency	% of Estimate
10%	$162,255,438	$2,392,606	1.5%
15%	$163,431,210	$3,568,378	2.2%
20%	**$164,526,906**	**$4,664,074**	**2.9%**
25%	$165,612,736	$5,749,904	3.6%
30%	$166,563,376	$6,700,544	4.2%
35%	$167,456,078	$7,593,246	4.7%
40%	$168,330,776	$8,467,944	5.3%
45%	$169,166,105	$9,303,273	5.8%
50%	**$169,988,614**	**$10,125,782**	**6.3%**
55%	$170,853,055	$10,990,223	6.9%
60%	$171,626,760	$11,763,928	7.4%
65%	$172,474,867	$12,612,035	7.9%
70%	$173,505,808	$13,642,976	8.5%
75%	$174,520,934	$14,658,102	9.2%
80%	**$175,626,899**	**$15,764,067**	**9.9%**
85%	$176,953,811	$17,090,979	10.7%
90%	$178,658,495	$18,795,663	11.8%
95%	$181,013,304	$21,150,472	13.2%

Contingency (Cont'd)

It should be noted that in a fixed price contract environment, EPC companies add their own (hopefully calculated) contingency into their price to cover their known unknowns. They own it. We often see a 10-15% increase in price (as compared to non-fixed price contract structures) due to EPC contingency. On top of that, you must add your assessed owner's contingency which typically ranges between 5-15% regardless of contract structure to cover unknown unknowns.

"But what happens if the desired estimate accuracy proves to be not so accurate?"

This is a question posed to me often by investors. The fear of overrunning budgets by 30%+ is crippling. Financial models cannot stand that level of capital cost sensitivity, so a 10-15% higher price that is fixed provides more comfort and perceived certainty. But what if you took that 10-15% and added it to the owner's contingency budget and absorbed the cost-risk with a strong owner's engineer at the helm?

You would have 15-30% total contingency to manage together with the EPC firm. Under a profit-sharing model, both parties would be incentivized to work as a team. Information would flow and change approvals would move quickly. Commercial disputes will be minimal. Influential response plans would be deployed collaboratively. Proactive project management and decision-making will govern. All-in-all, stakeholders would spend more time focusing on project execution, and less time squabbling over the ownership of profits or losses.

Performance Guarantees

A performance guarantee (a performance bond) protects downside risk by holding the EPC firm accountable for ensuring all the equipment works as expected when "connected" together. In its simplest form, an EPC performance wrap is an engineering design guarantee. Each respective process technology package typically comes with a performance guarantee of its own, but that does not necessarily mean that each piece of equipment will play nice with the others. A performance guarantee is intended to motivate the EPC to stand behind the engineering and do what it takes to achieve nameplate production capacity.

Some EPC performance guarantees require absolute compliance and impose unlimited make-good obligations on the contractor until attained. In other cases, and more commonly, the EPC firm will assume liquidated damages with a defined minimum performance level. These damages are traditionally capped, often ranging from 5-10% of the contract value. Additionally, there is typically an overall damages cap of 10-20% which this is factored into.

Are these performance bonds worth it?

To answer that you need to truly understand performance risk. After all, that is what the performance guarantee is designed to address.

Performance Guarantees (Cont'd)

PERFORMANCE QUESTIONS FOR EVALUATING PERFORMANCE RISK

- Is any new technology being deployed?
- Is there scaling risk?
- Are all vendors providing a guarantee on each piece of equipment?
- Are there any similarly designed facilities in operation?
- Has the fuel supply (often organic feedstock) been adequately sampled, tested, and considered in the design basis?
- Is there a realistic base case startup timeline? This is important because compressed schedules lead to poor commissioning, startup and operations practices and performance bottlenecks.

The answer to the question, are performance bonds justified, lies in the answers to the above questions. One could argue if you do not feel comfortable that the facility will be commissioned and started up properly over a reasonable time frame, then the real guarantee is that the performance bond will be pulled upon. If the performance guarantee is based on the feedstock provided by the owner's team, what is the probability that the feedstock may change or doesn't meet specification, thereby potentially voiding the guarantee?

This is not to say that performance bonds are not valuable motivators, but they only guarantee you will get some of your money back to pursue corrective actions, not that the plant will operate properly.

Performance Guarantees (Cont'd)

DELAY LIQUIDATED DAMAGES

Schedule liquidated damages (delay damages) are agreed-to costs that an EPC firm incurs when project completion is not achieved on an agreed-to date. Project sponsors typically have penalties if they fail to deliver the plant product output to their customers. Schedule liquidated damages are designed to cover all or some of these potential delay costs and inspire the EPC company to finish on time.

Liquidated damages are often calculated on a daily or weekly basis, and as a percentage of the contract price. Schedule liquidated damages typically range from 5-10% while contributing to an aggregate cap. To assess schedule delay damages, one must understand schedule risk. To understand schedule risk, one must understand the accuracy of a schedule at any point in time (much like cost estimate accuracy and risk).

PROJECT SCHEDULE LEVELS

Management/Milestone Level Schedule (Level 1)

A Level 1 schedule is typically a one-page bar-chart and milestone list that outlines, in broad form, the project objectives, significant milestones and phase relationships. It is simple to digest and serves as a quick way to view and assess critical milestones. This schedule also often includes key contractual milestones and requirements as it is included in the EPC contract.

Master Schedule (Level 2)

Level 2 schedules contain more detailed activities for each of the summary phases previously identified in the Level 1 schedule. This often includes a breakout of the various disciplines responsible for the activities in each phase, the critical engineering and procurement activities, the major elements of construction by work area, and general commissioning and start-up requirements. Generally, this is the first level of scheduled detail where logical links or task relationships may be shown.

Performance Guarantees (Cont'd)

Project Level Schedule (Level 3)

Level 3 schedules contain all project scope and are derived from key project execution stakeholder information (equipment suppliers, contractors, construction experts, etc.). This schedule is often referred to as a project schedule and oftentimes will go through a baseline approval process as it will become the foundation for which the project will be measured. The baseline schedule will typically have requirements to meet the Level 1 and Level 2 contractual requirements. While we like to see a version of this as the level of detail prior to any project financing, a hybrid of Levels 2 and 3 is often what is available. A fully detailed Level 3 will only exist if engineering was close to 100% complete before contract execution. A more common industry standard is to require a Level 3 baseline to be established 60 or 90 days after EPC contract execution.

Control Level Schedule (Level 4)

Level 4 schedules are developed and maintained by a project execution team and are commonly prepared by project leads and construction subcontractors to monitor and control day-to-day work activities and serve as the foundation for measuring project progress and performance.

Detail Level Schedule (Level 5)

Level 5 schedules are typically used for managing shutdowns, outages, and planned maintenance activities. Some of the specialty schedules (mini-schedules) for specific work tasks may also fall into this category. We see these types of schedules being utilized for highly specialized work tasks or where several contractors and trades need to coordinate work in a specific area.

Performance Guarantees (Cont'd)

PROJECT PLAN DEVELOPMENT

Developing the project plan is part art and part science. As described earlier, typical project stakeholders can consist of the primary EPC company along with their subcontractors and vendors, all of which have to hold up their portion of the schedule.

- EPC firms factor liquidated damages into their profit and loss statement. EPC firms do not think of it as the need to achieve the schedule but rather focus on the cost.
- Schedule issues are compounding. Course correction becomes limited as the project evolves through the execution lifecycle.
- You can't influence the schedule when the EPC company has the damages.

Project Schedule Risk

Assessing the risk in a project schedule is driven by the amount of detail available when developing the schedule along with the participation of all the stakeholders. At the point of project finance, a Level 2 schedule should be available, but a Level 3 is preferred as it represents a better project definition.

This level of detail typically breaks out enough scope to identify and evaluate the risks that exist between logically tied schedule tasks. It also should contain enough logic such that a scheduling software (such as Primavera) can run a PERT analysis to appropriately calculate project float along with other various standard schedule metrics that can provide a guideline to evaluate how aggressive the project schedule is.

THE COLLABORATIVE ALTERNATIVE

There are alternative approaches. Many are commonly used across mature industries; others are new market products. The appropriate approach to each of the major EPC contract components should reflect the assessed risk profile.

It should be acceptable not to use fixed-price turnkey-wrapped EPC contracts. If the project has been well developed and a significant project definition exists, fixed-priced EPC contracts are likely more harmful than good. If the project lacks definition, and many assumptions are steering the outcome, perhaps it is appropriate. I would argue it should be further developed before signing an EPC contract. There is strong evidence for utilizing more balanced contract terms based on risk profile.

Alternative Approach to Price

If a sound FEED package has been completed, material takeoffs exist, and a collaborative EPC pricing exercise has been completed, the perceived benefits of fixed price may not offset the negatives. Instead, consider a cost-plus model where the EPC contract passes through all project costs and applies a fixed markup for overhead and profit. This means the sponsor is taking on price risk, influenced heavily by the strength of the engineering package. However, those risks that are of higher likelihood to occur, and cause greater impact, can be assigned owners contingency and managed collaboratively. Any large scope gaps would be change orders in either structure, and thus we are really talking about equipment, labor, and quantity risk. Those risks should be manageable.

Key Benefits

- Reduced capital costs (initial) by eliminating EPC risk contingency, lower fees (EPC firms are willing to accept lower margins with reduced risk), and equipment and material markups.
- Proactive project management resulting from increased project information transparency, project tracking, and reporting (there is no reason to hide anything).
- Ability to quickly descope certain work packages if necessary (pending performance guarantee considerations).
- Increased flexibility to adapt scope if necessary, to control costs.

It is important to note that managing this type of contract structure requires a strong owner team or owner's engineer. Proactive project management, timely decision making, effective contingency management, and accurate project tracking and reporting are all critical to delivering a project on time and on budget.

Alternative Approach to Contingency

This must be discussed in conjunction with price because the price is driven by contract structure (risk allocation). In a fixed price environment, the EPC firm controls their internal contingency (built into their estimate), and the owner the same. Owner's contingency covers unforeseen events that are not a direct result of the EPC company's actions, and change orders typically derived from scope changes. In a cost-reimbursable or comparable contract structure, all the contingency is owned by the sponsor. This is powerful. Not only do you carry a large self-controlled budget, but you also control how and when it is spent. One could argue that contingency control and management is the single largest influencer of cost control.

Key Benefits

- Increased control over timing and implementation of risk response plans.
- Greater flexibility to "spend money to save money."
- Greater control over schedule acceleration initiatives.
- Ability to value engineer or control scope.
- Increased collaboration.

Alternative Approach to Performance Guarantees

To reiterate, performance guarantees are not a guarantee the plant will perform. It is a financial mechanism to motivate the EPC company to get the plant operating to nameplate capacity and allows the project sponsor to recover capital to rectify their inability to do so. The concern should be obvious. If a highly qualified EPC contractor is unable to get the facility to operate properly and satisfy performance requirements, who can? Is it too late anyway? Will off-takers remain patient? The truth is the best performance guarantee is one that is focused on directly influencing the performance itself.

There are several ways to accomplish this.

- Allocate capital and identify third-party commissioning and startup support resources or organizations that have deep experience in the specific plant process. This could be in lieu of the EPC firm taking on this scope, or in addition to (owner team side).
- Leverage equipment vendor resources. Most, if not all, process equipment vendors can and will supply resources to help during commissioning, startup, and operations. In complex sustainable infrastructure, the more knowledge you have around the table working collaboratively, the better (within reason).
- Establish a realistic commissioning and startup schedule. A rushed commissioning process is the kiss of death for plant operations. If the process is rushed due to unrealistic expectations, or to make up for construction delays, you all but guarantee a longer timeline to stable operations (at best).

Alternative Approach to Performance Guarantees (Cont'd)

Key Benefits

- Transitions mentality from contractual performance to "boots on the ground" performance.
- Reduces cost (for acquiring performance guarantee), allowing contingency capital to be deployed to correct performance-related issues.
- Opens project execution up to several additional qualified counterparties that may likely take a pass on the project due to the intensity of performance guarantee requirements.

Alternative Approach to Liquidated Damages

Sticks are not always better than carrots. Consider structuring the contract such that incentives are provided if certain milestones or accomplishments are met. These incentives should extend beyond traditional construction project level milestones and include things such as leadership, communication, and reporting. We often forget that it is the little things that make all the difference during the execution of a complicated project. Providing incentives for consistently issuing meeting minutes, limiting turnover of key project employees, and issuing consistent reporting on time are all simple ways to incentivize the small things that often have the biggest impact.

Key Benefits

- Provides opportunity for more collaborative relationships and culture driven by incentivizing good project management practices and effective communication.
- Better aligns ownership and mitigation of risk between EPC contractor and sponsor.

TIME TO CHANGE

If you take anything from reading this whitepaper, let it be that the better defined a project is during project development, the more flexible you can likely be for project execution and contracting strategy. Selecting an EPC firm and defining the commercial arrangement is a matter of defining and assessing risk. Think about it this way: If you live on the top of a hill in a dry part of Texas, you likely will not purchase flood insurance.

So, what comes next? Does the investment community shift their mentality around project execution risk and more EPC contracts are governed by an alternative, more collaborative, commercial structure? Or do EPC firms force the hand of investors by simply no longer offering the fixed price turnkey performance wrap contract product?

Either way, it is time to change the fixed mentality toward fixed-price contracts.