Strategies to Mitigate Risk and Improve Investment Return in Large Capital Projects

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Private equity investment opportunities in the energy industry are increasing due to the volume of large capital improvement projects and recent regulatory changes. The power industry will be required to engage in many large capital construction projects in the coming decade to maintain the operational reliability of existing and aging generating facilities or to build replacement facilities. Owners will be forced to comply with both existing and evolving environmental emissions regulations, and to meet the increasing generation demands in many parts of the United States. Additionally, recent Environmental Protection Agency (EPA) regulatory changes may require new investment in capital improvement projects.[1] An estimate by Cambridge Energy Research Associates (CERA) indicated that the electric utility industry in the United States would require approximately $800 billion of new investment by 2020. The aggregate cost of those anticipated projects exceeds the net book value of the United States power industry, creating a need for significant outside investment to meet future energy demands.

Additionally, recent regulatory changes encourage private equity investment in utility assets. For example, the Federal Energy Regulatory Commission (FERC), the primary regulatory authority for public utility holding companies, recently implemented policies[2] eliminating previous barriers to private equity investment in the power industry. These changes include: 1) making it easier for private equity firms to invest in utility assets; 2) allowing higher rates of return of transmission assets; and 3) streamlining merger review. Because of the significant investment opportunity and the supportive regulatory climate, the $45 billion takeover of the Texas utility TXU Corporation by a consortium of private equity groups led by Kohlberg Kravis Roberts (KKR), the Texas Pacific Group, and Goldman Sachs could represent the beginning of a trend in private equity's substantial investment in the power sector.

While large capital improvement projects provide an opportunity for profitable investment, the return on that investment must be protected through the active management of the inherent risks. Owners have traditionally attempted mitigating financial risk by employing a two-prong management philosophy. First, the utility relies heavily on the owner's engineer to represent the owner's interests during the execution of the project. Second, the utility pursues a contracting strategy that shifts risk to the contractor. As explained in more detail below, the paradigm of attempting to shift the risk via the contract and delegating away an active management role on the project provides owners/investors with a false sense of security and fails to protect the owner from financial risks.

This article explains that active owner involvement and use of industry standard project controls for schedule, procurement, and claims management are the best strategies to mitigate risk and improve the rate of return on any investment in large capital projects. Although the article focuses on owners in the power industry, the concepts addressed herein regarding risk mitigation apply equally to any owner facing a large capital improvement project.

CONTRACTUAL RISK TRANSFER ALONE IS AN INCOMPLETE RISK MANAGEMENT STRATEGY

Traditionally, many owners have contractually shifted cost and schedule risk to contractors and then adopted a laissez-faire approach to manage large capital projects. Unfortunately, this approach fails to mitigate risk on large capital projects. This strategy is based on a common misconception that an owner can mitigate a majority of, if not all, risk by contract. Owners believe they can delegate almost limitless project risk to the contractor, including schedule risk, pricing risk, labor productivity, and other threats to schedule and budget. Because utility companies may not have the internal resources to manage the cost and schedule of a large capital project, they believe a strong owner's engineer and a strong contract is an effective substitute. Based on the perceived contractual "protections," a utility frequently concludes that developing or hiring its own construction management personnel will be superfluous and unnecessary. Unfortunately, experience shows the contract itself, without any direct owner involvement, cannot adequately protect the utility's interests and ensure the contractor will complete all work on schedule, within budget, and without any claims or disputes.

Compare a large construction project to flying a plane. Relying solely on contractual risk shifting is analogous to the owner abandoning the cockpit to the contractor. Owners who rely solely on the contract terms are flying blind in business class. The project might overcome any equipment failures and navigate any unforeseen obstacles to land safely within the schedule and budget targets, but the owner is taking a gamble with this strategy. If the owner is riding in business class, trusting the contractor's positive reports of the project status, the owner will not know about emerging dangers until after the plane's damaged. While the owner may rely on the contractor to navigate the plane, a better risk mitigation strategy is for the owner to claim a seat next to the contractor in the cockpit. This way, the owner can obtain the data necessary to verify the contractor's progress. Owners should require access to data and only establish trust through verifying that data. From that vantage point, owners can influence the decision-making process, ultimately increasing the chances that the project has a positive outcome.

It is attractive to owners to believe that the potential risks can be anticipated and addressed in the contract. While lengthy construction terms may provide many remedies for various problems that may arise, when an owner is in a position to enforce those remedies, the contractor has already failed. The contractor's breach means the project cost will increase and likely has little, if any, chance at full schedule recovery. Additionally, the owner will not receive any compensation under the contract quickly or easily, or without incurring legal fees. More importantly, the contract will not provide a complete remedy to the owner in the event of a significant breach of contract (i.e., significant schedule delay) because the contractual remedies never make the owner completely whole. Regardless of the amount of liquidated damages for delay in the contract, the amount typically fails to compensate the owner for the total actual losses. By playing an active role in monitoring large capital projects, owners can influence their own fate rather than passively relying on the contract to keep the project on track.

The project costs *increase* as the owner transfers more risk to the contractor. As in any business transaction in which one party absorbs greater risk, contractors in the utility industry embed the risk shifting in their up-front price. Often, there is no transparency to the owner regarding the amount added to the project costs through risk shifting. In addition, there is a direct relationship between an owner's overly aggressive risk transfer and the likelihood a contractor will raise claims on a project. A study by Independent Project Analysis (IPA) found the risk for claims increases based on the amount of risk the owner shifts to the contractor.[3] For example, if the contract contains liquidated damages for schedule completion and an overly aggressive schedule, the contractor is financially motivated to raise all delay or interference claims for additional time and/or compensation.[4] An overly aggressive schedule is a construction schedule that is substantially shorter than the industry

standard duration for that type of project. Due to the increased risk, 33% of aggressively scheduled projects have claims, compared to 7% of conservatively scheduled projects.[5] Second, an owner increases the likelihood of claims by selecting the low bidder in a competitive bid process.[6] When an owner uses a competitive bid procurement process, the market forces can encourage a contractor to price a job below market to secure the work. If the contractor bids work for below market compensation, it may seek to minimize losses and create a profit through claims during the project. For example, Barshop [2007] asserts that contractors raise claims on 70% of competitively bid projects where the selected contractor significantly underbid the competitors.

This research statistically demonstrates that contractual risk transfer alone is an inadequate mitigation strategy for large construction projects. The contract can't adequately protect the utility's interests; it can't ensure that the contractor will complete all work on schedule, within budget, and without any claims/disputes. A more effective risk mitigation strategy on large capital projects is to employ active owner involvement, which is only possible if the owner has the data to understand the project status and influence the contractor to effect change if necessary to meet cost and schedule goals. Instead of blind reliance on the contractor to complete the project successfully, the use of project controls gives the owner an opportunity to verify the construction's progress, test any underlying assumptions to the contractor's plan, propose alternate solutions to issues that arise, and verify that risk mitigation is occurring to keep the project on track. Active owner involvement and the use of industry standard project controls can improve the rate of return on any investment in large capital projects.

PROJECT CONTROLS CAN IMPROVE THE INTERNAL RATE OF RETURN ON LARGE CAPITAL PROJECTS

Effective use of industry standard project controls can improve cost and schedule performance and, in turn, the rate of return on investment on large capital construction projects. Internal rate of return (IRR) can be calculated by the following formula:

$$\text{IRR} = \frac{[(\text{present value of revenues}) - (\text{present value of costs})]}{(\text{value of capital investment})}$$

There is an inverse relationship between project costs and IRR. Hollmann [2003] has shown that for each 10% increase in the capital project costs, there is a corresponding approximate 2% decrease in the IRR. To maximize the IRR on large capital improvement projects, utility companies should employ project controls to keep costs down.

The most effective strategy to mitigate costs on large capital construction projects is to utilize *project controls* in the initial planning stage and throughout construction. Project controls is a term used in the construction industry to refer to multiple tools including cost estimating, construction planning and scheduling, and claims management. A study of 500 construction projects in the heavy industrial sector (Griffith [2006]) demonstrated that projects adhering to the industry best practices for project controls averaged 8% lower costs and 13% faster schedules than other projects. To improve overall cost, performance owners should engage key industry standard scheduling techniques and project controls early in the project. Each of the identified project controls is described in more detail in the following sections.

Schedule

In the construction industry, cost is a function of time. As noted earlier, projects adhering to the industry best practices for project controls averaged 8% lower costs and 13% faster schedules than other projects (Griffith [2006]). Accordingly, utility companies should engage key industry standard scheduling techniques early in the project to improve overall cost performance. In addition, large construction projects are inherently complex and often involve the careful sequencing of tens of thousands of activities. While owners are not expected to fully engage in the daily ins-and-outs of all activities on such projects, utilizing the tools necessary to gain a basic understanding of the project's performance goals and monitor whether those goals are met is a key part of active management.

Direct owner involvement can improve schedule performance. According to Galloway [2005], a well-developed and consistently updated critical path method

(CPM) schedule can increase the probability that a construction project finishes on time. Subjective measures of construction progress are inaccurate and inadequate (Hollmann [2003]). Timely and reliable project controls schedule data inform both the owner and contractor how and when the critical path is changing, identifies activities that are being delayed and whether activities should be re-sequenced. Such data are necessary to create viable work-around plans to help avoid potential project delay and therefore meet key schedule milestones. There is rarely only one way to sequence the work or complete the construction. The construction means and methods are typically the contractor's choice. However, the owner should understand the risks and benefits of the contractor's chosen construction methods and be able to follow along as the project progresses. By reviewing and understanding the project controls data, an owner can identify any unreasonable risks in the contractor's selected path, propose alternate solutions, and intervene in the event that the owner determines that the contractor is taking inappropriate cost or schedule risks.

Due to the importance of effectively managing the schedule, it is critical that project controls personnel are identified as key personnel on large capital projects. Owners can either hire internal project controls professionals as a part of the project management team or require the contractor's management team to include a project controls team. Regardless of who employs these key professionals, the owner should obtain periodic and accurate project controls data from qualified personnel managing the data in accordance with industry standard schedule management techniques. To maintain accurate project controls reporting, an owner should consider employing independent project controls personnel who report to someone outside of the project controls team. Project controls professionals are often subordinate to project management on large capital projects. This reporting hierarchy can motivate the project controls team to generate deliverables biased toward reporting progress that is pleasing to management. For example, an inflated reported percent complete may not be discovered until late in the project when what should be a minimal punch list indicates substantial remaining work. To maintain an accurate view of the schedule status, owners should strongly consider employing independent third-party project controls personnel whose only motivation is accuracy.

Key features of an industry standard project controls package that owners can use are explained below. Griffith [2006] addresses the following key schedule standards that have a positive impact on large capital projects: 1) integrating all project phases into a single project schedule; 2) applying CPM techniques; 3) resource-loading critical project resources into the project schedule; and 4) project team members' active and formal review of the project schedule prior to implementation.

First, an *integrated project schedule*, an important tool in project planning, provides a detailed and complete picture of the entire construction life cycle. By including all project phases into a single schedule, the project management team has the opportunity to plan critical interfaces between engineering, construction, and start-up.

Second, applying *CPM techniques* requires the project team to segment the project into discrete activities, estimate the time duration of each activity, and evaluate the possible and preferable sequencing of the construction activities. This is an important tool for controlling and managing the project during the execution of construction. Third, *resource loading* the schedule is the act of defining the amount of craft labor resources needed for each activity. This exercise will demonstrate when the peak labor will occur and whether the planned approach is feasible for both schedule and cost.

Finally, the core project management team review of the schedule acts as a sanity check on the accuracy of the schedule activities, verifies that the owner's and the contractor's expectations are aligned, and ensures that the management team members who will be ultimately responsible for the completion of the job have bought into the plan.

These scheduling standards have been correlated to improved cost performance on large capital projects. When the owner's project team includes personnel trained in CPM scheduling, the owner is in a better position to negotiate a justified time extension and any appropriate compensation for delays and impacts. Without such expertise, the owner lacks important tools to evaluate the accuracy of a contractor's schedule reports and improve the likelihood of achieving key schedule milestones.

Procurement

An owner should select a contracting strategy that equitably allocates risk. The owner should also consider

including financial incentives that align the contractor's objectives with those of the owner. Not only is this a good procurement practice, but it can avoid claims. Fair allocation of project risk allocates risk to the party who is realistically best able to manage, control, and insure against the risk. Inequitable risk allocation increases costs and should be abandoned as a risk mitigation strategy.

The contract terms are important to minimize the owner's risk in executing a large capital project. While a discussion of all of the key contract terms is outside the scope of this article, as a general matter, large capital projects raise certain unique contractual issues that a utility company's standard form contracts do not address. As a result, utilities should seek advice from experienced construction attorneys familiar with the power industry to obtain guidance regarding the appropriate terms and conditions for these projects. Too often, owners are willing to accept contractors' provisions for project controls without fully sizing up the risks and benefits of doing so, simply because owners often do not comprehend the nuances of these methods. The contracts on large capital projects should include terms addressing all industry standard project controls. The provisions must create an obligation for the contractor to provide the type of information and level of detail regarding construction and schedule progress necessary to comply with the schedule guidelines discussed previously. Without accurate information on a regular basis, the owner will be unable to effectively mitigate the risk of schedule delays and cost increases.

Cost/Claims Management

Barshop [2007] estimates that serious disputes arise in 10–30% of all construction projects; one in four construction projects made a claim. A claim is a request for additional compensation driven by many potential reasons, including increased profit pressures on contractors; poorly developed or executed contracts; increasing risk allocated to contractors; inadequate owner involvement in the project; overly aggressive schedules; or a combination of the factors listed above. One of the main root causes of construction disputes is an inequitable allocation of risk between owners and contractors (National Research Council [2007]). As discussed, research has shown that projects that transfer more risk to the contractor are significantly more likely to have a claim. The transaction costs for resolving disputes and claims can be substantial and increase the costs on a large capital project.

On a large capital project, it is critical that owners actively participate in the change management process and the timely resolution of disputed claims. Costs to the project increase if disputes are not resolved early. Studies have shown that if a dispute is not resolved promptly by mutual agreement, three phenomena occur that increase the cost impact of the eventual settlement on the project: 1) The contractor's claim value will increase; 2) the contractor's percentage of recovery measured as a rate of settlement value/claim value increases; and 3) the overall likelihood of contractor recovery increases (Callahan [1998]). If a contractor does not assert a claim until the end of the project, there is an increased risk the contractor will inflate the claim value or assert multiple claims in an attempt to recover a larger percentage or all of its cost overruns by blaming the owner for all cost impacts. Accordingly, early dispute resolution is tied to the financial success of large capital construction projects.

The best dispute resolution strategy is to resolve disputes through "real time" processes during construction. This may include step negotiation, dispute review boards (DRB), or employing a project neutral or designated mediator (Groton [2007]). Negotiation among the project leadership team can resolve most disputes on large capital projects. Negotiation involves discussing the problem(s) and reaching a reasonable resolution by focusing on the legitimate interests of both parties. The focus is to solve the problem so the project can move ahead rather than assign blame. In recent years, construction contracts have included a step negotiation process that delineates a process to escalate disputes one or more levels above the project leadership team. In both utility companies and general contracting companies, the corporate executives typically have oversight and governance responsibilities for the capital project but do not have unlimited time to resolve commercial disputes. As a result, this creates an incentive for the project teams to take reasonable positions and make a good faith effort to resolve the dispute at the project level before having to explain a commercial impasse to their superiors. As a backstop to the "real time" dispute resolution process, most construction contracts specify mediation and/or arbitration as a prerequisite to filing litigation. Mediation is the most widely used third-party intervention strategy for conflict resolution.

Some owners and contractors mutually agree to utilize a DRB as a dispute resolution strategy. The DRB consists of one to three neutral construction experts who become generally familiar with the project players, scope, and progress and commit to being available to render prompt advisory opinions regarding any problems the parties are unable to resolve. This process has been extremely successful in resolving issues and keeping transaction costs low. In the 1,100 projects that have used DRBs in over the last 40 years, parties adopted 98% of the DRB's recommendations (Groton [2007]). The cost of using a DRB is approximately 0.15% of the total costs of construction, which is less than the transaction costs of arbitration or litigation (Groton [2007]). It is advisable for the parties to agree at the outset whether the decisions of the DRB are discoverable in any litigation or arbitration. Using a standing dispute resolution neutral, a DRB, a standing arbitrator/mediator, or project neutral can be an effective dispute prevention technique. By having continuity in the decision maker, the parties are motivated to deal fairly rather than exhibit gamesmanship, dilatory tactics, assert frivolous claims, or assert extreme and unsupportable positions.

Records and documentation play an important role in settling construction claims early. If the owner has been collecting and actively managing the construction from the beginning, the project leadership team can quickly gather the relevant documents and evaluate the strength of its defenses to a contractor claim. As a result, in dealing with sophisticated contractors on schedule and cost issues, the use of project controls data levels the playing field. When an owner has timely and accurate project controls data regarding the construction's progress, the owner has a substantial evidentiary trail to determine whether a contractor claim is warranted and why. An owner who understands and requires a CPM schedule analysis from a contractor to prove a delay claim also functions as a prophylactic against frivolous and factually unsupported delay claims. Accordingly, the project schedule is an important analytical device for an owner in evaluating a contractor's claim. A 2005 survey by the Association for the Advancement of Cost Engineering International (AACE) found that over 67% of respondents indicated the use of CPM scheduling minimized claims on construction projects and that over 84% of respondents indicated they believed the use of CPM scheduling was essential in delay claim resolution (Galloway [2005]). The project schedule (and specifically an analysis of the planned versus actual schedule) provides critical information to the project leadership team to evaluate what went wrong and who is responsible. The CPM Schedule will demonstrate what activities were critical at the time, which is valuable in resolving disputes. Indeed, courts and other administrative bodies now consider proper schedule technique, particularly CPM, as one of the only valid means for proving liability and damages.[7]

Negotiating changes during the project by a functionally integrated project leadership team based on objective project controls data is by far the most cost effective dispute resolution option. Functionally integrated teams are important to managing construction claims. A functionally integrated team is one that includes not only engineers but also people with expertise in business, operations, maintenance, law, construction management, and project controls. The benefit to the creation of an integrated project leadership team is to give owners the resources necessary to better monitor contractors' performance to prevent problems and, when problems do arise, to avoid escalation to disputes and litigation. This is particularly important on large capital projects because in the IPA study all of the projects valued at $1 billion dollars or more that did not use integrated teams had claims (Barshop [2007]). On all projects included in the study, only 15% of projects using functionally integrated teams had claims compared to 35% of the projects using non-integrated teams.

A key part of an owner's risk mitigation strategy on a large capital project should include the active participation in the change management process and the timely resolution of disputed claims. Project controls is an effective tool in resolving disputes early and preventing cost increases to the project.

CASE STUDIES

A multitude of owners, including numerous utilities with nuclear, fossil fuel, and alternative energy supply, engaged the Construction Law Group at Schiff Hardin LLP (Schiff) to resolve claims at the conclusion of large capital construction projects. After the multi-million disputes were resolved, many owners requested the firm's assistance in developing "lessons learned," hoping to avoid the same result in future projects. For

example, Schiff provided control methods and analysis of an ongoing $1.2 billion construction project to return a nuclear power plant to service that was, at the time, more than three times its original budget. The services included 1) analyzing the root causes of the cost and schedule overruns; 2) identifying critical lessons learned from that phase that could be applied to the restart of the remaining units; and 3) providing project oversight of the second phase of the project. In Schiff's experience, the common denominator on projects that ended with one or more significant claim is that the owners did not use an effective risk mitigation strategy—they did not take an active role in the project and did not utilize industry standard project controls. Not only was this ineffective in achieving the project's cost and schedule goals, but the owner's lack of data regarding the project handicapped the owner's defense to the contractor claim(s). Most of these owners resolve to employ a new strategy on the next project after enduring the time and cost of dispute resolution. The change that owners make is playing a larger active role during construction and using project controls data in a real time basis to influence the fate of the project.

The Construction Law Group has extensive experience providing procurement and project controls services to assist owners in assessing and mitigating project risks, drafting and negotiating contracts that fairly allocate project risks, and implementing industry standard cost and schedule controls. Schiff's team has worked in the trenches with the project team during construction to monitor and analyze the engineering, procurement, construction and start-up progress, cost issues, controls and change order issues, potential claims, identify trends and resolve commercial issues. Schiff has recently completed projects with clients who invested in an active risk mitigation strategy and engaged Schiff early in the planning phase to provide oversight and project controls services throughout one or more large capital construction projects. For example, a utility in the Midwest engaged Schiff's procurement, oversight, and project controls services for its comprehensive energy plan including the construction of a new 850 MW (gross) supercritical coal-fired plant, the construction of a 100 MW new wind generation facility, and environmental upgrades to two existing coal-fired plants including state of the art air quality control technology to reduce plant emissions. Schiff has also worked with utility clients whose large capital projects receive heavy regulatory scrutiny. In a regulated environment, it is important that owners are actively mitigating risk and obtaining accurate data to respond to inquiries about the project from state or federal agencies.

Based on Schiff's experience, project controls is an important tool for owners in large capital projects. Owners tend to underestimate the commercial letter writing campaign contractors use on large capital projects. Contractors typically send correspondence to the owner to document certain events that will lay the foundation for a commercial claim that may be asserted sometime in the future, possibly years later. Owners who have project controls data are in the best position to provide a timely factual response. This provides many benefits, including eliminating the future assertion of frivolous contractor claims and encouraging the contractor to abandon the letter writing in favor of productive problem solving between the project teams.

CONCLUSION

The effective use of project controls, when properly executed, is invisible to anyone not affiliated with the project. On any project using industry standard project controls, the owner has access to timely and accurate data regarding cost and schedule and engages in active and detailed discussions with the contractor to avoid or mitigate delays and, if necessary, recover the schedule. Any disputes that arose during the project would be resolved in large part using project controls data to determine the cause of delay, allocation of fault, and the appropriate compensation, if any. After project completion, the owner does not have a quantification of the dollars saved because of its use of project controls, however, members of the project leadership team would likely opine that the project and the utility experienced significant savings and that the use of project controls was the key to the project's success.

The research clearly demonstrates that the former strategy of minimizing risk of large capital construction projects by *solely* relying on the terms of a contract is ineffective at reducing costs. A better strategy and the best chance at mitigating risk on a large capital construction project is for the owner to be actively engaged; the owner should implement industry standard project controls including procurement, cost and schedule, and claims management throughout a large capital construction project.

Because of the unique risks associated with large capital improvement projects, traditional financial data sources can't accurately assess the risk associated with buying or investing in an energy company. As a more accurate measure of the investment risks on a large capital construction project, the private equity investors should hire independent construction experts to prepare a project risk assessment. This assessment can be conducted at any point during a large capital project, but will be most effective in influencing a positive investment outcome if performed while the large project is in the early planning stages. An effective risk assessment evaluates the major factors that can influence the total costs on the project: strength of the contracts; the owner's project management staffing levels and management philosophy; the utilization of industry standard project controls; and the effectiveness of the claims mitigation strategies. If engaged early in the project, such experts can provide periodic follow-up reports to investors to supplement the owner's efforts in achieving cost and schedule objectives and maximize the return on investment.

ENDNOTES

[1]The EPA continues to release numerous regulations to curb pollutants from power generation plants and other stationary sources, including National Ambient Air Quality Standards for particulate matter and ozone; new source performance standards for greenhouse gases covering utilities and refineries; prevention of significant deterioration preconstruction review permits for greenhouse gases; regional haze and coal combustion waste standards under the Solid Waste Disposal Act; new Industrial Boiler maximum achievable control technology (MACT) rules; and cooling water intake structures regulations under Section 316(b) of the Clean Water Act.

[2]Energy Policy Act of 2005 (EPACT) replaced much of the Public Utilities Holding Company Act of 1935.

[3]Barshop [2007, p. 37]; National Research Council [2007, pp. 2-3].

[4]Barshop [2007, p. 39]; National Research Council [2007, p. 3].

[5]See id.

[6]National Research Council [2007, p. 3].

[7]*Mega Constr. Co. v. United States*, 29 Fed. Cl. 396 (1993) (contractor's delay claim was denied because the bar chart submitted by the contractor failed to establish the relationship between the activities delayed by the government and the impact on the overall project completion).

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