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IPA Newsletter

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The Business Case Makes the Project!

By Ed Merrow, IPA Founder and President

There's an old expression in project management: "Do the right project and do the project right!" The implication is clear—that it is common to do good projects with poor business cases and vice versa. It turns out after careful examination that this distinction between the right project and the right execution is mostly wrong. Our study demonstrates that if the business case that sets scope development in motion is a strong and compelling idea, the project that follows is very likely to be strong as well. Conversely, weak business cases routinely produce weak projects.

Within the community of companies that makes up IPA, there is very good agreement about what constitutes Best Practices in capital projects from the point at which we start scope selection right through turning the project over to operations. We understand that the product of FEL 2—the scope development phase—should be a centered cost estimate with a range around it, and a centered schedule with a range around that. At the end of FEL 2, the business decision to go forward or not on a final basis will be made. That is not Final Investment Decision (FID). FID will wait until we have finished FEED and all execution planning, which helps ensure that we actually get the planned work done (sometimes we do and sometimes we don't).

When we move back from FEL 2, our consensus of what constitutes Best Practice falls apart. We have a basic agreement about what the activities should be. We know that we need to articulate the business need or the business opportunity. We should look for non-capital solutions and do a project only if required. If a capital project is required, a business case for that project needs to be developed. We need to identify a set of

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IPA improves the competitiveness of our customers through enabling more effective use of capital in their businesses. It is our mission and unique competence to conduct research into the functioning of capital projects and project systems and to apply the results of that research to help our customers create and use capital assets more efficiently.

Independent Project Analysis, Inc. is the preeminent organization for quantitative analysis of capital project effectiveness worldwide. At IPA, we identify Best Practices to drive successful project outcomes.
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alternatives, we need to progressively narrow that list, and, finally, we select a single scope to optimize, bringing us to closure around FEL 2.

But if we agree on the basic activities, we don't agree on who should do what, what the work process will be, and—most especially—on what constitutes a best practical level of development in the business case. We understand all too well that when the business case is weak, at the end of the project everyone will wish that we had not done it at all. Unfortunately, it isn't really uncommon for us to go forward without a fully robust business case. So how can we know whether the business case is strong enough to generate a good result or whether the result will be a poor one? That is the role of the Project Viability Assessment (PVA).

The PVA is a project evaluation conducted just as the project is about to commission the scope development team to do its work. We developed the PVA after assessing the business case development in over 1,000 capital projects in the IPA databases. The projects ranged from about $40 million to just over $500 million. All are onshore and are distributed around the world. All types of projects are represented, from pure brownfield revamps to true greenfields. Commodity and specialty chemicals, refining, mining, pharma, and distribution projects are all well represented.

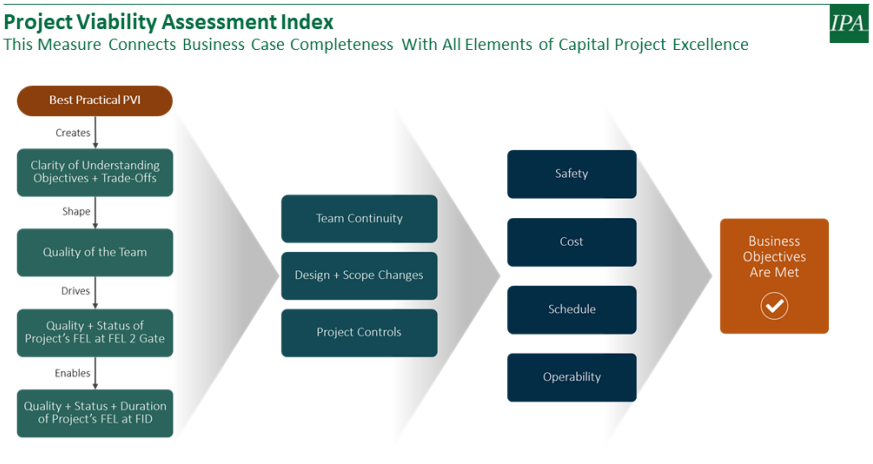

Figure 1

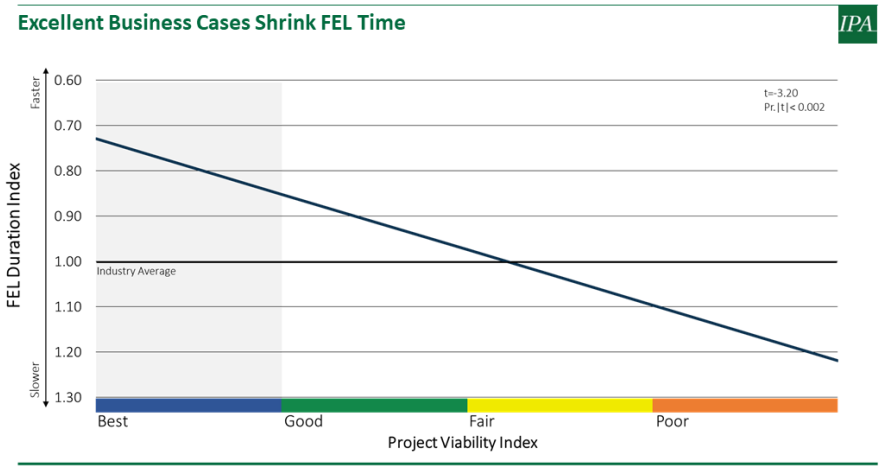

Figure 2

We examined the completeness of the business case development in four major areas with a number of questions within each:

- The business basics—objectives, priorities, key business risks
- The financial side—market windows, cost limits, competitor analysis
- Site and location issues—operations acceptance, site regulatory, and HSE
- Scope frame—product slate and capacities, technology, and OSBL and infrastructure

From these data, we developed a Project Viability Index (PVI) that functions for Gate 1 (the business-to-scoping gate) the way that the FEL Index works for Gate 2 and beyond. We then explored the relationships between the PVI and all elements of the project, as shown in **Figure 1**.

What we found amazed us. **Figure 1** shows 11 blocks that represent the elements of good projects and every single one of them is driven by the PVI—even team continuity, changes, and controls! And the strength of the relationships is remarkable. Even safety is predicted by a good business case—DART[1] and recordable incidents fall significantly as the business case improves. Of course, it isn't the business case that directly improves construction safety. But the business case drives good front-end loading and enables better controls. These practices in turn drive safety.

One of the complaints that business has about capital projects is that they take way too long on the front-end to bring to FID. It turns out that the best predictor (and driver) of FEL 2 and FEL 3 time is the Project Viability Index. As shown in **Figure 2**, when the business case is fully defined, the time requirements to achieve excellent definition shrink by 30 percent from average. And as the PVI quality declines, the time requirements go up and up. There is a 50 percent swing in FEL time from low to high.

At the end of the day, cost, schedule, operability, and safety are all significantly better with a better PVI. And, of course, the reason we did the project in the first place—to meet business objectives—is routinely achieved with a good PVI.

Who benefits from a Project Viability Assessment?

- The scope development team is in a much better position to find the right scope quickly
- Governance of the capital project system is enhanced
- Project teams will find their work easier to do with fewer changes
- But the biggest beneficiary by far is the business sponsor of the project!

What is involved in doing a PVA?

The PVA entails a 2-hour interview with the business sponsor and others working on the project business case development with an IPA PVA analyst. Once the questions are answered and the documentation requested is provided, the PVA is ready within a calendar week.

For information contact Ed Merrow or Kate Rizor. (See contact information below).

Project Viability Assessment (PVA)

The PVA measures the strength of your project's business case, shares insights into the likely outcomes, and provides actionable recommendations for improvement.

Contact Edward Merrow (**emerrow@ipaglobal.com**) or Kate Rizor (**krizor@ipaglobal.com**) to determine if your business case is strong enough to set your project up for success.

[1]DART = days away, restrictions, and transfers

Cost & Schedule Risk Analysis: Current State and Opportunities

By Aditya Munshi, Deputy Director, Cost Analysis Group

Cost & schedule risk analysis is used by most industry (large) capital projects to estimate the amount of cost and schedule contingency needed to center the base estimates and deterministic schedule. IPA defines cost contingency as an amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs. It is meant to cover inadequacies in complete project scope definition, estimating methods, and estimating data. Contingency excludes scope changes, extraordinary events (strikes and disasters), management reserves, and escalation/currency effects. Essentially, contingency funds are expected to be spent during the project, but the project team is not sure what items will consume the cost in actuality. Similarly, for schedule, most large projects conduct a Monte Carlo Schedule Risk Analysis, which is an AACEI Recommended Practice,[2] and traditionally accepted to be Best Practice for schedule target setting.

IPA research[3] has shown that while most owner companies expect a +/-10 percent accuracy for their authorization estimates prepared at the end of FEL 3, Industry has, on average, observed a -17/+42 percent accuracy on their completed projects; that is, 80 percent of completed projects observed cost growth from -17 to +42 percent from their planned cost estimate (including contingency) at the end of FEL 3. Similarly, if we look at capital projects with costs greater than $10 million ([2022]US$) that were completed over the past decade, 80 percent of those projects observed schedule slip between -4 and +55 percent.

IPA has seen significant variability in the level of maturity across owner companies in terms of implementation of these cost and schedule risk analysis Best Practices. For example, we see project teams conduct purely qualitative risk analysis on schedule, basic quantitative analysis that includes the traditional activity range estimating, modern quantitative analysis (which includes all activities they affect), and finally the advanced integrated cost-schedule risk analysis.

Getting any of these methods to work is hard. For example, one of the challenges in getting Monte Carlo schedule analysis to work is estimating correlations between activity durations in an effective fashion. Similarly, Monte Carlo based methods for cost contingency setting fail because they focus on individual cost element distributions. Cost estimates overrun because the scope was not all defined, and not because the distribution around the individual elements was incorrect. Most industry projects use fabricated distributions, which are not based on a historically observed and unbiased distribution of outcomes. Additionally, these analyses assume orthogonality of the distributions, which denies the reality of projects that most things are intimately connected.

We find that 57 percent of large projects (>$20MM,[2022]US$) authorized over the past decade used a schedule risk analysis to set their schedule targets at the end of FEL 3, while around 60 percent used a Monte Carlo simulation method to set the cost contingency. For small projects (<$20MM), we find that the use of schedule risk analysis drops to 22 percent, while Monte Carlo cost simulation drops to 37 percent. Despite the wide use of these practices for large projects, we have not seen industry extract significant benefits in terms of improving their cost and schedule predictability. One of the reasons, as shown in **Figure 3**, is that Monte Carlo generated cost contingencies are unrelated to

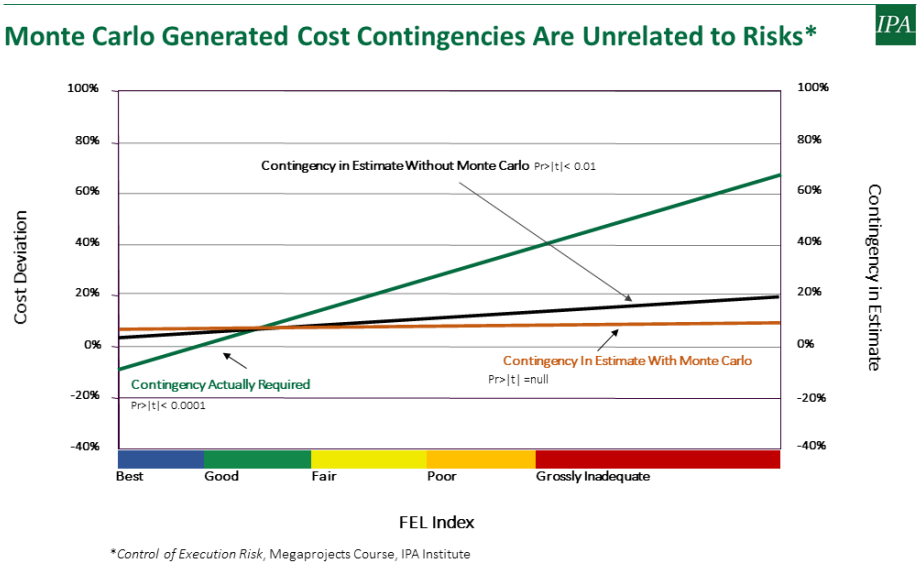

Figure 3

risks. As shown in the figure, based on IPA data, we find that projects observe significantly larger cost growth and consume higher amounts of contingency at completion as the level of project definition (as measured by IPA's FEL Index) worsens. However, whether the project used a Monte Carlo simulation or not, we see no differences in the amount of contingency included in project estimates at authorization across the spectrum of project definition.

Irrespective of the method used, AACE has recommended the use of parametric methods applied on historical project data to identify the effects of systemic risks like scope definition, quality of schedule/cost estimate, project controls, team integration, and so forth to validate the results of the cost and schedule risk analysis. IPA has launched a new product, the Cost & Schedule Risk Analysis (CSRA), to help Industry in leveraging the past project performance to quantify the inherent uncertainty in the cost and schedule targets, and identifying the level of cost and schedule contingency required to center their targets at the desired level of tolerance for cost growth and schedule slip (e.g., cost and schedule contingency required for a 50 percent chance of underrun [P50] or 80 percent chance of underrun [P80 estimate]).

IPA's CSRA assesses the effects of systemic and project-specific risks in determining the optimal contingency requirements for cost and schedule. The project systemic risks are the artifacts of the strengths and weaknesses of a project system and planning and definition work during the Front-End Loading (FEL) phase of a capital project. As part of the CSRA evaluation, IPA develops quantified measures of the clarity of business objectives, quality of project definition work, team composition and integration, and the competitiveness of the base cost and deterministic schedule targets at authorization, which have been established over the years by IPA research conducted on thousands of completed projects as the greatest source of uncertainty on project outcomes. The CSRA also incorporates the residual project-specific risks, which are dependent on the conditions and events specific to a project location, scope, and strategy, (e.g., risks of bad weather, labor shortages, long lead equipment delivery delays, and new technology problems).

Based on our findings, we recommend that owner companies leverage their internal cost and schedule databases and develop parametric risk quantification methods of their own to bring some level of empiricism to their cost and schedule risk analysis and use the findings to validate their traditional risk quantification methods. If you are interested in learning more about how IPA can help in the risk quantification exercises, contact Aditya Munshi (**amunshi@ipaglobal.com**), CSRA product owner for IPA.

Cost & Schedule Risk Analysis (CSRA)

Like a crystal ball for capital projects, the CSRA accurately predicts your project's cost and schedule and identifies the potential risks.

Contact **Aditya Munshi** at **amunshi@ipaglobal.com** to find out if your next project will come in on-time and on-budget.

[2] AACE International Recommended Practice 64R-11: CPM schedule risk modeling and analysis
[3] Quality of Cost Estimates, Melissa Matthews, IBC 2018, IPA

IPA's Upstream Team Staffing Tool to the Rescue

Sample Staffing Profile for the Planning & Execution Phases

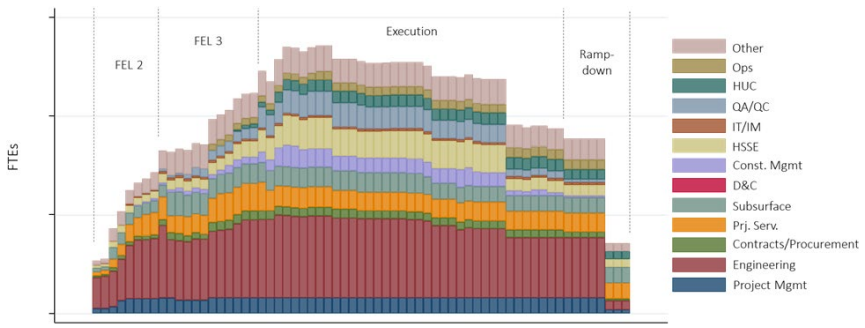

Figure 4

Project Resource Profile Comparison With Benchmark Profile

Figure 5

The Problem: A company planning to execute a complex, multi-scope project for the first time in many years came to IPA for help in understanding staffing requirements for the team. Because this was the first project of this magnitude for the company in recent history, the company needed guidance in creating a staffing plan. The team lacked a single complete life cycle staffing plan that included execution, which is atypical for projects approaching the Define phase (Front-End Loading [FEL] 3).

What IPA Did: The formation of the owner team is the foundation of project success. Strong owner teams include all the skills and points of view required to assemble the scope that will be acceptable to operations while meeting business needs with respect to cost, time to first production, and production quality and reliability.

IPA used its new Upstream Team Staffing tool, which is based on detailed staffing information taken from 55 major E&P developments, to identify not only how many team members were needed but also how many in each role and when those staff members should be added to the team. Bringing the right team members in at the right time supports megaprojects, which are inherently fragile, because it ensures that team members with the right expertise and decision-making authority are available to address issues in a timely manner before they cascade into future phases.

A sample staffing profile for the planning (FEL) and execution (detailed engineering and construction) phases is shown in **Figure 4**.

As can be seen, staffing levels typically peak early in execution after ramping up throughout definition. The number of full-time equivalents (FTEs) needed, as well as the specific positions needed and the timing, is determined by the project characteristics, including facilities capacity and type, hydrocarbon type, technology used, contracting strategy, and operating model. Thus, we can determine the industry Best Practice staffing profile based on a project's unique characteristics. After we have the Best Practice profile, we can compare it to what is planned for the project, as shown in **Figure 5**.

Figure 4 compares the project's overall staffing plan with Best Practice. For the sample project, we found that the resources planned matched industry Best Practices through the Define phase. At the start of execution, however, when industry Best Practice is to ramp up, this project planned to keep the resource level where it was, lagging industry Best Practices. Understaffing at this critical time, especially in certain positions, can lead to project failure; this is particularly the case for megaprojects, which are hard to get back on track once things go wrong.

The comparison is also done on a function-by-function basis. It is not unusual for a project team plan to include too many FTEs in one position and not enough in another. For example, the sample project's engineering staffing was on the low end in the Define phase but construction management was staffed above range for that phase. Knowing the ideal staffing for each position in each phase ensures owner resources are used to their best advantage.

How It Turned Out: IPA's assessment helped our client ensure that the project team had the right people at the right time for project success.

Moreover, as this project was one in a series, the findings and lessons learned from this project could be applied to future projects.

The case study highlighted here involved a company that needed help building its staffing plan from the bottom up. Other clients have used this tool to confirm their current plans and tweak them to give their projects the best chance of success. The upstream staffing assessment is also an important tool for project managers who need to ensure a corporate push for lean staffing does not derail their projects or for companies in joint ventures who need independent support for their plans.

Upstream **Project Team Staffing Assessment**

Does your staffing plan set your project up for success or failure? Find out with IPA's new Upstream Project Team Staffing Assessment.

Contact **Katya Petrochenkov** at **kpetrochenov@ipaglbol.com** to evaluate the staffing plan for your next project!

The Challenge of Innovation for New Ventures and Startups

By Andras Marton, Director, Integrated Energy Practice

The need for significant technology innovation is the most important challenge we face in the transition to low- (or no-) carbon energy sources. In response (and in part driven by various economic incentives), several new companies have started up, or existing companies have started new ventures, to address this issue. During IPA's 30+ year history, we have seen several such cycles in various process industries, and we have studied what makes these ventures succeed or fail.

One of the broad systemic challenges of innovating in the process industry is the comparison to innovation in other, less process-focused industries, such as consumer electronics and software solutions. Because these industries innovate at a much faster pace—and therefore form the base of our innovation experience—most parties involved in innovation base their assumptions and expectations on them. These expectations and assumptions, however, are often unrealistic. The belief that the typical startup development approach can be applied to the process industries is incorrect.

Innovation in process technologies is unique because of the requirement to run at large scale in a reliable 24/7 operation over many years. We often see new ventures with a very good understanding of the chemistry and the underlying science behind their process; however, there is almost always a major gap in understanding how to deliver the technology on a large scale in a commercially economic fashion. Addressing this gap by planning for regular re-starts, upgrades, modifications, and rapid prototyping typical of electronics and software development is just not a viable or economically possible approach to developing process technology. Having a clear, empirically based understanding of the economics behind a commercial type operation of the process is critical, because margins are typically significantly smaller than the error associated with any extrapolation from non-commercial-type operations. To prove commercial-scale technical and economic viability, a careful analysis and optimization of the technical risks and associated development costs needs to be done. The development path has to adequately represent the process and economic complexity, at an appropriate scale, and with sufficient run times. These requirements usually mean a different level of capital investment and different time horizons than our experience in other industries would suggest. When the development path does not accurately identify and address commercialization challenges, fixing things later often requires so much money and time that it renders the venture unviable.

Throughout the years, IPA has observed several root causes of failure, many of which stem from reliance on innovation in other industries. These failure modes can be grouped into three interrelated areas: inexperience with commercializing new technology, lack of funding, and lack of experienced personnel.

Inexperience With Commercializing New Technology

Inexperience with commercializing new technology starts with the inability to recognize and accurately gauge the degree of newness, associated risks, and consequently development needs. This is not because these ventures lack technical capability—quite the opposite, they tend to have a significant organization focusing on the technology, often including the inventor. The issue is that the inventors have a detailed familiarity with the science that underlies the technology, leading to overconfidence in its application to commercial operations despite having only limited empirical data for that application. We have also noticed that inventors often focus on continuous improvement of the technology and not on systematically de-risking toward commercial operation.

Lack of Funding

Another challenge that new ventures face is around funding. Because these ventures are most often debt or equity financed, the cost of money plays an important role in decision making. Restricted flow and limited availability of funds early on can significantly curtail the commercialization process even when the new technology risks are correctly recognized. Limited funds for piloting and attracting the right talent, and for allowing enough time to prove out viability, often lead to development at a commercial scale rather than at a pilot scale. This is of course not feasible: facilities designed for commercial operation, particularly in a low margin business, are too expensive and take too long to fix to allow for development. Running partially functioning facilities is a safety and economic liability.

Even when technology development is not an issue, not having enough funds early on will undermine developing appropriate plans for project delivery, and restricting the flow of funds can hamper efficient execution. Any issues during the venture's development can further exacerbate funding issues and thus impede making the right decisions. We often see ventures experiencing development issues lose control or undergo disruptive owner changes as investors pull out of the venture or sell their stake. We rarely see success when investors take control of critical decision-making because their experience is often not directly applicable to process commercialization.

Lack of Experienced Personnel

The third main challenge new ventures often face is having the right organization and personnel. This is typically due to the combination of the above two issues—lack of commercialization experience and funding challenges—as well as general inexperience with major project delivery. The most common shortage is in resources with deep experience in process commercialization and project planning and execution. The consequences are lack of project development discipline and overreliance on contractors.

Heavy reliance on external help for process development, such as vendors and contractors, has proven problematic. These external entities usually do not have the right tools and equipment to do the right experiments and tests, and their priorities are not aligned with those of the technology owner. As a result, they rely on assumptions and extrapolations to commercial type operation that are often proven wrong later on.

Similarly, relying on engineering contractors to do everything during project planning usually does not serve the owner's best interest. Engineering contractors rarely have the required commercialization experience and are not in a position to make the best decisions for the owner company. Contractors are also not in a position to manage the often complex shaping challenges we see with low margin energy projects (see IPA's article on contracting green hydrogen projects in this newsletter).

Other common organizational gaps in new ventures include the lack of ability to manage multiple contractors responsible for various components of the effort. Communication challenges and gaps between different scope components, different roles, and different phases are common root causes of failure. These organizational gaps often lead to out-of-sequence work, undue optimism in cost and schedule targets, and substantial misses in operational performance. This optimism is a key cause of failure of new startup ventures.

In our experience, all new ventures have some combination of these issues—the extent depends on the technology step out. Recognizing these challenges—and addressing them early on in the development cycle—is a hallmark of successful innovation in the process industries. Not following these practices can lead to the ultimate failure: an otherwise viable technology branded as failure because of taking a wrong commercialization path.

What Is the Right Contracting Strategy for **Green Hydrogen Projects?**

By Emily Nott, Associate Project Analyst and Andras Marton, Director, Integrated Energy Practice

New energy projects, such as those that involve green hydrogen production, face many challenges associated with commercializing emerging technology. One contracting strategy that has worked well for other nascent technologies involves a design competition for the front-end work (or FEED). Can this strategy work for green hydrogen projects?

The Promise of Green Hydrogen

Hydrogen has long been touted as the low emission energy source of the future. Hydrogen powered cars have been on the market for almost a decade, and over the last few years, several governments have pursued research into a combined domestic gas supply. The challenge to commercialization is generation of hydrogen from a green supply. Most hydrogen today is made from natural gas, becoming so-called gray hydrogen, but there is a new wave of investment into green hydrogen and more is on the horizon.

Green hydrogen is made from electrolysis of water. Unlike the other colors of the hydrogen palette, it can be produced with almost zero emissions if the electricity supply is a renewable source. It could be the answer to the growing industry question of how to store surplus energy generated from renewable sources, particularly when battery technology requires maturation.

The role of hydrogen in the global effort to meet government climate targets has not gone unnoticed by oil majors in Europe. Companies previously known for their success in oil and gas—many of whom are long-standing IPA clients—are ramping up their investment in hydrogen. As these and other companies venture into unfamiliar territory, several of them have engaged with IPA to help navigate governmental policy and incentive schemes. Our work for these clients follows our business model of risk analysis and benchmarking to help with making strategic decisions.

The Challenges of Green Hydrogen Projects

Like all ventures, hydrogen projects benefit from the primary drivers of success: a strong business case, fully aligned stakeholders, bought-in sponsors, an integrated owner team, and *Best Practical* Front-End Loading. However, these projects have additional considerations. Hydrogen—and new energy projects in general—do not always prioritize cost or schedule, instead favoring the need to demonstrate interest and willingness to invest in the new industry. The most challenging aspects of these projects arise from two (often interacting) factors: the scaling of the nascent process technology and the complex stakeholder alignment challenges that arise from external stakeholders coming from different sectors with different priorities (some tied to governmental targets) and different risk tolerances.

The Role of Design Competitions

The combination of a diverse set of stakeholders and an emerging technology often leads to solving the challenges through a contracting strategy that relies on the contractor's technical and project development capabilities. In particular, the strategy selected by a number of companies undertaking green hydrogen projects is a FEED design competition with rollover of the FEED contractor into a more traditional lump-sum engineering, procurement, and construction (EPC LS) contract for execution. This strategy consists of hiring two or more EPC contractors (or consortia) to undertake FEED on a scope the owner developed. The competitors often bring with them licensed technology, and the winning contractor's technology is adopted for the project.

This contracting approach can be insightful to owners who do not have previous experience in the field. When the technology is unfamiliar, a design competition forces the FEED contractor—often in a consortia with the owners of the technology—to develop the optimal design to meet business needs in a competitive way. Design competitions typically produce better defined FEED packages at the start of execution than other contracting forms. As a result, cost

growth from authorization to mechanical completion is often minimal for project teams selecting this contract type. The predictability associated with FEED competition also renders it attractive to investors because it minimizes uncertainty.

Although this strategy can be insightful from the technical perspective and works well for a broad range of industrial projects, its success still depends on following project Best Practices. In particular, a key component to success is clearly articulating and aligning on the sponsors' business objectives early on, and sharing them with the competing contractors. The business objectives must be coherent and include detailed trade-offs among the project's priorities. Because a break-even business case for green hydrogen projects is rarely viable without public support, these projects tend to have a various stakeholders and gaining alignment between them on cost, schedule, and technology commercialization (i.e., commercial-scale operation) is a challenge. This alignment is necessary to create a stable project environment in which to execute the project.

Once the business objectives are well defined, owners still need to ensure the scope requirements are well developed and shared with the competing contractors in a consistent way while ensuring no information flows between the competitors. Owner organizations will need to support all competing contractors and ensure that best project planning practices are consistently followed. Gaining early sponsor alignment, adequately supporting the competing contractors, and following best project planning practices requires significant owner attention and resources. If these practices are followed, a FEED design competition with rollover into a more traditional EPC-LS contract for execution can be a winning strategy.

IPA's New Energy Transition Initiative

As part of our New Energy Transition Initiative, IPA is helping clients who are implementing cutting-edge innovation—and those just beginning to consider green energy initiatives. IPA is positioned to provide support on the understanding, development, and selection of execution strategies for hydrogen projects. Our focus is to support project teams in setting up their projects for success by guiding them through early shaping of the project, alignment among partners, and best commercialization and project management practices.

Carbon Capture Utilization and Storage (CCUS) Project Performance Norms

On June 14, 2022, IPA kicked off a cross-industry research study that will establish capital cost and schedule norms for carbon capture utilization and storage (CCUS) projects to improve early decision-making.

- Owner companies who participate in the study will gain access to essential CCUS project cost metrics and insights to directly inform and improve early decision-making for CCUS projects
- Those who joined from the start will have the opportunity to directly influence the study scope as part of the steering committee
- The initial participants represent a good cross-section of CCUS projects, from diverse regions and involving different sources of CO^2
- Interested companies can still join the study after the kick-off

CCUS projects are increasing in frequency and global significance as regulatory entities, investors, and shareholders further drive the demand for decarbonization and sustainability. However, owner companies do not have access to the reliable cost and schedule estimate and performance data needed to inform decision-making. The study results will help participants understand the current industry cost and schedule performance from completed and in-development CCUS projects, and make informed decisions for opportunity screening and concept selection.

Companies interested in joining this ongoing study are urged to contact Adi Akheramka at **aakheramka@ipaglobal.com** to request more information.

Improving Sustainability Practices in Capital Projects

Lessons Learned From Two Decades of Safety Improvement

Sustainability has become a major talking point in recent years in Industry, the halls of government, and even at the kitchen table. How human actions affect the global climate and quality of life for future generations has attained new levels of prominence in the global discussion of what to prioritize as a society going forward. Chemicals, refining, agribusiness, and other downstream sectors are significant contributors to global greenhouse gas emissions and remain a particularly difficult industry to decarbonize due to the variety of processes, priorities, and practices of each sector. As part of the ongoing effort to improve sustainability practices in Industry, IPA is researching how companies are rolling out sustainability programs and is identifying gaps and Best Practices to improve sustainability outcomes.

The State of Sustainability in Projects Today

IPA has collected extensive information on company sustainability practices and has established a baseline of where Industry is with regard to corporate sustainability structures, project-level practices, common sustainability metrics and key performance indicators, and communication structures. This preliminary research found that company approaches to sustainability are mixed across Industry, with companies at different stages of development in their sustainability strategy rollouts. Most companies have announced climate goals, usually with a 2030 target and an end target of being carbon neutral by 2050, and have assigned dedicated staff on the corporate level to define and manage company sustainability strategies. Additionally, most companies IPA has surveyed increased research and development spending to improve sustainability innovation of their product lines, with many companies expecting their sustainability strategies to yield significant results in the upcoming years.

However, IPA found that most companies have yet to effectively translate sustainability from their corporate offices down to the site and project levels. As shown in the graphic below, less than 10 percent

Most New Roles Were Added at the Corporate and Business Unit Level

Fewer Companies Have Added Roles at the Individual Project Level and 30 Percent Have Added None

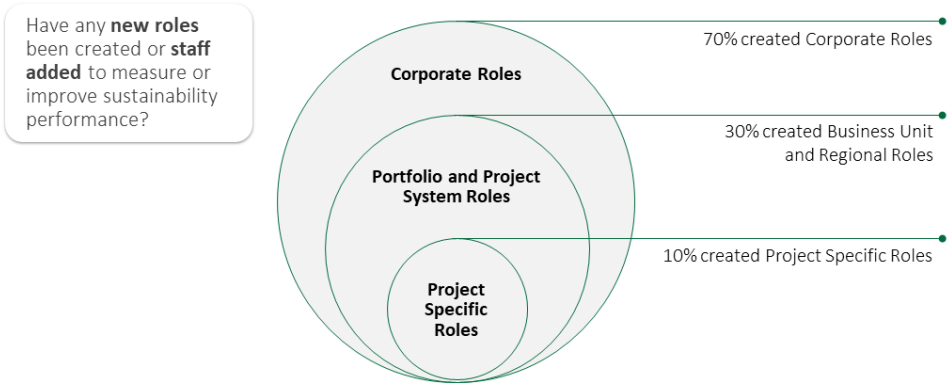

Figure 6

of companies surveyed have created project-specific roles dedicated to ensuring sustainability is considered in project planning and execution. Sustainability, in the current industry scenario, is not universally discussed in project business planning, the stage IPA research indicates has the greatest effect on project shaping and execution outcomes. Similarly, sustainability project definition practices—such as inclusion in scoping activities, vendor sustainability pre-qualifications, and sustainability expectation alignment with engineering contractors for project design and detailed engineering—are not standardized across Industry at this point. **(See Figure 6.)**

Outside of including sustainability in project-planning discussions, Industry has yet to standardize how sustainability progress is tracked and shared. Less than a quarter of companies surveyed have developed project-level sustainability Key Performance Indicators and targets; additionally, sustainability metrics are not frequently updated or communicated across all parts of the company. Similar to safety and cost metrics, sustainability metrics are critical in understanding how well a strategy is working and in identifying gaps that may be preventing best performance, while also ensuring ownership of progress and making that progress more visible to the company as a whole.

To summarize, Industry is at an important junction on the path to improving environmental stewardship where decisions made now will have long-lasting consequences for how company divisions and project teams approach sustainability going forward. Developing a robust sustainability strategy that translates corporate goals down to the project-level is critical for improving project sustainability performance, which, in turn, will help companies meet their corporate sustainability goals.

Lessons for Sustainability From Project Safety Improvements

A good analogy for the current industry sustainability scenario is project safety performance. Safety performance and environmental stewardship are both license-to-operate issues: companies risk their reputation with stakeholders and customers if they choose not to do anything about an issue that society collectively considers to be a cause for concern. Prior to the 1990s, project safety performance, relative to today, was poor. Starting in the 1990s, rising concern about project safety practices led industry leaders and lawmakers alike to begin thoroughly assessing company project safety performances and passing laws and corporate policies to improve outcomes. Through resource allocation, the standardization of practices, and constant vigilance, companies were able to radically improve their project safety performances to the point where they are at today. As shown in **Figure 8**, the recordable safety incident rate of IPA's core member clients decreased by 70 percent over the last 15 years.

IPA helped companies improve safety programs during this key period by developing safety metrics that allowed companies to better track safety program rollout and fill gaps. In **Figure 7**, we identify four pillars that

Figure 7

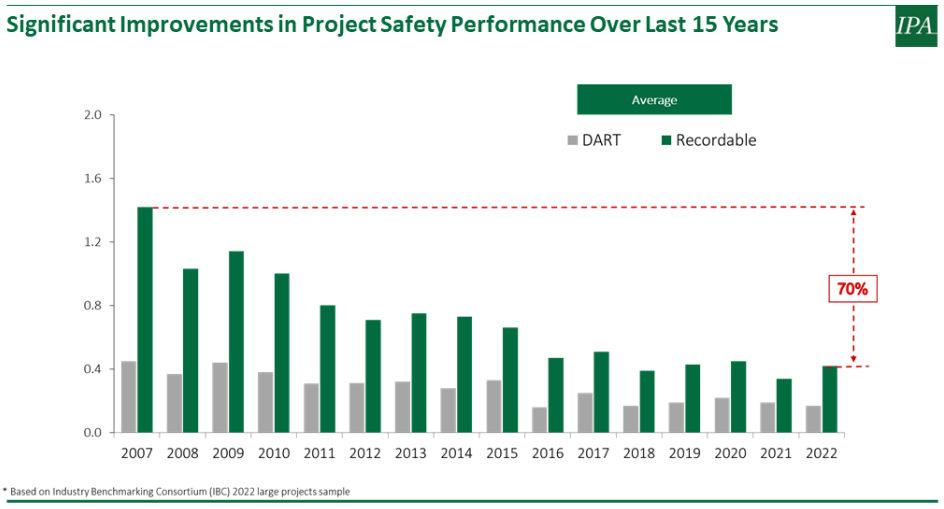

Figure 8

were essential to improving safety programs in the 1990s and early 2000s, and draw comparisons to sustainability rollout, with the belief that companies can leverage lessons learned from safety improvement to influence sustainability improvement. Safety improvement began with the allocation of senior staff to study the problem, develop safety programs, and manage the execution of those programs. Senior staff began tracking safety metrics more closely and those metrics began affecting company decisions in addressing safety issues. Tracking metrics allowed companies to identify gaps in safety programs and allocate resources to fill those gaps. Finally, companies brought construction contractors into the conversation, and safety performance became an integral part of the bidding process, where contractors with poor safety records were far less likely to be hired.

The Next Steps In Sustainability Improvement

Sustainability improvement can be approached with the same method in mind. Industry is currently at the point where environmental stewardship has become an important issue frequently discussed across all levels of society. Most companies made the important first steps of assigning senior staff to define sustainability strategies and manage the implementation of those strategies. The next step will be the standardization and development of metrics across Industry to track the efficacy of sustainability programs and use those metrics to influence company decisions; IPA is working with numerous companies to define standardized sustainability metrics that can be used to benchmark their project-level sustainability performance against Industry. The closer tracking of sustainability progress metrics will better identify gaps in sustainability programs, allowing companies to allocate personnel and resources to fill those gaps. Finally, since project planning and scoping activities have such a profound effect on project sustainability outcomes, it will be important that companies bring vendors and engineering contractors into the discussion and begin emphasizing sustainability in the bidding process.

We, as an Industry, face a monumental challenge in the upcoming years as we pivot from traditional practices to ones with better sustainability outcomes. As with safety performance, sustainability is a process that will require constant vigilance on the behalf of companies; however, Industry already managed to implement safety strategies that dramatically improved safety performance in the past, and Industry should use those lessons learned to influence sustainability strategies going forward. IPA has years of research on improving safety performance and is leveraging this information as we research and develop sustainability metrics and Best Practices to help companies improve their sustainability strategy rollouts. Through cooperation, IPA is optimistic that these services will be invaluable in helping companies achieve their sustainability goals.

For More Information

This study is part of IPA's larger sustainability research efforts. To learn more about how IPA can help your company make better sustainability-related decisions for project systems and individual projects, or to join the IPA Carbon Working Group (CWG), contact Adi Akheramka at **aakheramka@ipaglobal.com.**

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Alberta Capital Projects' Improvement Signals Its Emergence From the Lost Projects Decade

Alberta capital projects outcomes showed a marked improvement over the previous decade, driven by improved project practices in definition and execution.

IPA'S 2022 Annual UCEC Meeting **Returns to Texas**

The Upstream Benchmarking Cost Engineering Committee (UCEC) will be held in person on Wednesday, June 15th in The Woodlands, Texas, for the first time since 2019. In addition, live webinars will be held for all presentations following the meeting for those who cannot attend in person.

The objective of the UCEC is to help improve upstream project and business results by providing exclusive metrics for better cost engineering. The UCEC cost, schedule, and quantity-based metrics are used by participating companies to validate their internal estimates with industry data. UCEC also provides research into practices and project characteristics that drive better cost and schedule outcomes.

The annual UCEC meeting will provide time for networking with other member companies and discussing new metrics and highlights of the current year's metrics program. Attendees will also learn about new IPA research including:

- Market Escalation and Procurement Trends: The objective of this study is to understand observed and expected escalation trends across various cost categories and procurement trends in the current market.
- Schedule Risk Analysis: This study presents the parametric approach of schedule risk analysis and major systemic factors that drive schedule slip in E&P projects.

Attendees will also receive updates from IPA on the energy transition and its effects on UCEC member companies. The meeting will wrap up with a metrics and research brainstorming session.

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Contact Aditya Munshi at **amunshi@ipaglobal.com** to make sure you receive the July 2022 issue!

IPA Institute **2022 Course Schedule**

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Advancing Project Knowledge

Course	Dates	Times	Language	Fee	Click to Register
IN-PERSON COURSES					
Project Management Best Practices*	September 19 & 20 London, UK	9 a.m. to 5 p.m. (Greenwich Mean Time)	English	$1,500 USD	REGISTER
VIRTUAL COURSES					
Front-End Loading (FEL) and the Stage-Gated Process	June 28 & 29	10 a.m. to 12 p.m. (E. South America Time)	Portuguese	$300 USD	REGISTER
Capital Project Execution Excellence and Project Controls	July 12 & 13	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$400 USD	REGISTER
Project Stakeholder Alignment Through Successful BEAM Implementation	July 19	9 a.m. to 12 p.m. (U.S. Eastern Time)	English	$300 USD	REGISTER
Best Practices for Site-Based Projects	July 25–29	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$1,200 USD	REGISTER
Front-End Loading (FEL) and the Stage-Gated Process	July 26 & 28	10 a.m. to 12 p.m. (E. South America Time)	Spanish	$300 USD	REGISTER
Project Management Best Practices*	September 12–16	9 a.m. to 12 p.m. (U.S. Eastern Time)	English	$1,200 USD	REGISTER
Front-End Loading (FEL) and the Stage-Gated Process	September 20 & 21	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$400 USD	REGISTER
Establishing Effective Capital Cost and Schedule Processes	September 26–30	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$1,000 USD	REGISTER
Capital Project Execution Excellence and Project Controls	October 4 & 5	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$400 USD	REGISTER
Gatekeeping for Capital Project Governance	October 11–13	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$600 USD	REGISTER
Best Practices for Site-Based Projects	October 17–21	9 a.m. to 12 p.m. (U.S. Eastern Time)	English	$1,200 USD	REGISTER
Project Stakeholder Alignment Through Successful BEAM Implementation	October 25	9 a.m. to 12 p.m. (U.S. Eastern Time)	English	$300 USD	REGISTER
Front-End Loading (FEL) and the Stage-Gated Process	November 1 & 2	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$400 USD	REGISTER
Gatekeeping for Capital Project Governance	November 8–10	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$600 USD	REGISTER
Capital Project Execution Excellence and Project Controls	November 16 & 17	9 a.m. to 11 a.m. (U.S. Eastern Time)	English	$400 USD	REGISTER
Project Stakeholder Alignment Through Successful BEAM Implementation	November 29	9 a.m. to 12 p.m. (U.S. Eastern Time)	English	$300 USD	REGISTER

* ***Group Discount Available:*** Register 3 and send a 4th for free!

IPA Events and Presentations

Cost Engineering Committee (CEC)

September 20–21, 2022
Tysons Corner, VA

The CEC is a working subcommittee under the Industry Benchmarking Consortium (IBC) that assists cost engineers by providing metrics and tools that offer an unbiased snapshot of industry cost and schedule estimates and trends. The CEC focuses on all aspects of cost (or investment) engineering, including cost estimating, scheduling, and project control practices and metrics, with the goal of expanding the owner cost engineer's capabilities. The primary vehicles for accomplishing these objectives are validation metrics, Best Practices research, and practice sharing. Contact Andrew Griffith at **agriffith@ipaglobal.com** for more information.

Upstream Industry Benchmarking Consortium (UIBC)

November 14–16, 2022
Tysons Corner, VA

The UIBC is solely dedicated to the exploration and production (E&P) industry. It provides an independent forum for each participating company to view key metrics of its project system performance such as cost and schedule, Front-End Loading (FEL), and many others against the performance of other companies and share pointed and detailed information about their practices. The consortium highlights Best Practices, reinforcing their importance in driving improvements in asset development and capital effectiveness. Contact Andrew Griffith at **agriffith@ipaglobal.com** for more information.

International Project Management Conference (IMPC)

December 12–13, 2022
Kuala Lumpur, Malaysia

IPA is sponsoring the IPMC 2022, which will focus its theme on The Era of Disruptive Technology and Sustainability. The IPMC is an exclusive cross-industry gathering of project practitioners. Per the event prospectus, IPMC 2022 will "explore the disruption to conventional business models in creating a new breed of project management that is capable of innovating and navigating technology disruption in a sustainable manner in response to world demands."