



WHY HIGH OIL PRICES CAN BE BAD FOR ENERGY COMPANIES

By Frédéric Jobert, Björn Ewers, Hashim Rashid, and James Reynolds

ALTHOUGH OIL PRICES continue to fluctuate, industry observers believe that when the dust settles, the market will have recovered from the stunning fall in prices from a peak of \$115 per barrel in June 2014 to under \$35 less than two years later. At first blush, that would seem like good news for the oil industry. But in fact, rising oil prices are a mixed blessing. To be sure, they are good for profits and make shareholders happy. At the same time, however, they correlate with worsening outcomes for large capital expenditure projects—inevitably forcing companies to earmark more money for oil recovery.

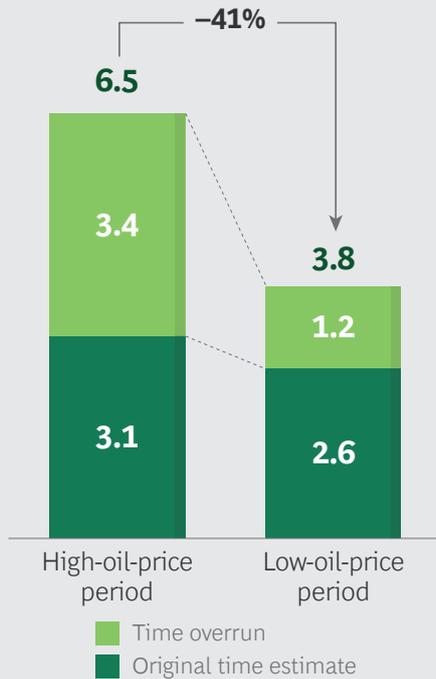
Why the bad outcomes? To answer this, BCG examined the performance of a sample group of upstream oil and gas capital projects during periods of high and low oil prices. While we found that cost and scheduling overruns were endemic at all times, project performance deteriorated significantly in periods of higher oil prices. On average, during high price eras, capital projects exceeded original time estimates by more than double and costs were 46%

above anticipated budgets. By contrast, during low price periods, scheduling and cost overruns averaged out to 20% and 6%, respectively. (See Exhibit 1.) And while cost overruns may not be a perfect measure of project performance (because they depend on how realistic the initial budget estimate was), these problematic trends also show up in less relative and more reliable gauges. For instance, capital intensity (the amount spent to add a barrel of oil to a company's output) is 10% greater when oil prices are climbing or at historical highs.

Of course, a simple explanation for this is that the number, complexity, and average cost of projects undertaken during high and low price periods are different enough to make up for the distinctions in overall outcomes. For instance, when oil prices are lower, smaller and more predictable projects—which are easier to manage and maintain cost controls—are the norm. In addition, the organization is operating at a relatively slower pace, making more talent available to monitor these projects. Equally important, competition for contractors and

EXHIBIT 1 | Industry Faced Much Higher Overruns During High-Oil-Price Periods

Average project duration
(years)



Average capital intensity
(capital expenditure in US \$/BOE¹ of capacity addition)



Source: BCG analysis.

Note: High-oil-price period: 2003-08 & 2011-14; low-oil-price period: 2009-10 & 2015-17. Figures shown for assets reaching FID (final investment decision) in the stated time period. Analysis considers 288 projects for high-oil-price period and 77 projects during low-oil-price period. Average project duration is average time taken to execute a project post FID. Average capital intensity is weighted average sum of latest cost estimate divided by the total estimated production capacity (P-50 BoE) for each project.

¹Barrel of oil equivalent.

equipment is diminished, in turn reducing construction costs.

Yet we believe that these factors don't explain the differences completely, nor do they provide a sufficiently meaningful rationale for oil and gas companies to avoid the opposite: less attractive outcomes when prices rise. Indeed, in our view the more useful answer is that higher prices trigger toxic, undisciplined behaviors that are toned down during tougher periods of low oil prices.

What's the Problem?

The troublesome behaviors that emerge during high oil prices can be broadly considered in the following manner:

1. Overly Ambitious Targets. The earlier the date of first oil, the quicker the project can generate revenue. This presents a huge incentive for management to demand

unrealistic timelines for projects—and for middle management to make top executives happy by promising more oil more quickly than they can deliver. Complicating this, the potential returns from a capital project based on net present value are higher when the price of oil is elevated. By extension, that means that there is an opportunity premium for accelerated schedules—and yet another rationale for “window dressing” a project with overly optimistic completion assumptions.

Worse yet, this aggressive scheduling occurs more often than not in an uncertain environment of bullish markets, more complex and bigger projects, and fewer skilled managers, workers, and equipment—precisely the conditions that should encourage oil companies to be more cautious. Overall, inflated production forecasts compel project teams and contractors to favor short cuts that are ultimately harmful to the

project during design and construction phases. (For more on this topic, see [“Why Schedules for Large Projects Shouldn’t Include Dates,”](#) BCG article, June 2016.)

2. Fast-Tracked Front-End Engineering. Often the initial design phases of a capital project are truncated in response to the aggressive schedules. Because the quality and depth of front-end engineering design (FEED) directly affect project performance in the construction phase, this can significantly determine whether the project meets anticipated goals or falls flat. Project managers insist that a project’s chances for success depend on analyzing and fully understanding the location, size, rock formations, and unique properties of the oil and gas reservoir to the extent possible before the work begins.

The alternative, rushing through stage gates to meet ambitious timelines, frequently handicaps construction field crews, leaving them with less information to foresee potential problems and create work-arounds before they become worse than just nuisances. If navigating challenges becomes a challenge in itself, the project’s pace will slow considerably. Viewed broadly, fast tracking can be an extremely expensive mistake because in large capital projects, the cost of risk rises over time as the project’s complexity and moving parts multiply. Moreover, past the initial stages, the amount of money tied up in a capital project increases rapidly while the ability for a project owner to influence the activities of an array of contractors in various phases of construction—and the ability to mitigate risk—decreases. Diligence and discipline during front-end engineering could at least serve as a bulwark against this future risk.

3. Gold Plating Designs. When the FEED phase of a project is not geared toward optimizing cost levels but rather is focused on quickly starting construction, gathering sufficient information and making educated, cost-effective decisions about the unique aspects of a project site are often sacrificed. Faced with this shortcoming, it is not unusual for oil and gas teams to gold plate, or add redundant structural elements, in order to plan for the unknown during the

construction phase. One former oil industry construction engineer recalled a project that had built two foundations for a single oil rig when one was obviously all that was needed. In other cases, extra underground wells may be drilled—all in an attempt to make up for the design work that was neglected initially.

Another cause of gold plating is the mushrooming of specifications and standards for projects without justification or careful deliberation, more as a generalized protection against risk than a targeted response to a specific design or construction need. Instead of optimizing project cost levels up front, oil and gas companies have leaned on brutally competitive contractor bidding wars and lump sum contracts to minimize expenses. A far more effective approach that would increase the odds of a project’s success would be, early on, to question the drivers of extra cost, challenge specifications, eliminate gold plating, and find better alternatives.

4. Owners Acting as Passive Monitors. The issues created by short-circuiting the initial aspects of the project are carried over to the construction stage. In that phase, oil and gas companies are prone to take hands-off stances, assigning the job to a contractor with a list of key performance indicators to measure progress, but essentially hoping to outsource the risk. But in reality, teamwork between project owners and contractors is imperative because the contractor alone is not in a position to make design and operational decisions that are dependent on the project owner’s expectations. Moreover, this collaboration brings the best possible knowledge and resources to bear in addressing a problem or handling on-the-ground challenges.

5. Misaligned Contractor Payment Incentives. The situation is not helped by the lump sum agreements that are routinely used to hire contractors for oil and gas projects. Instead of facilitating risk anticipation and mitigation, these contracts create perverse incentives for contractors to ignore potential problems or at least avoid telling project owners about them. Otherwise,

their margins may be affected by having to do more work or bring in additional equipment and materials. In addition, contractors are generally paid as large sections of the project are completed. Consequently, it is to their advantage to undertake the big-ticket items first, such as subsea pipelines that may account for a large portion of the value of the contract, even though constructing such items too early may lead to complications that set the project off course.

If evidence is needed for how these behaviors can be damaging to an oil and gas company's performance, look no further than Kashagan Field, a massive offshore oil field in Kazakhstan. Phase 1 began in 2000 with ambitious expectations to produce first oil five years later. But a combination of project management missteps stymied the effort almost from the beginning. According to project managers and news reports, unrealistic timetables—which would have been challenging to meet even in the unlikely event that the project suffered no complications—led to inevitable fast tracking. As a result, design decisions had to be made before the necessary study was completed, and in the rush to hire contractors to minimize costs, companies were brought onboard that were later shown to be inexperienced.

By the time Kashagan was finally producing oil, in late 2017, only after the design was reconfigured numerous times and engineering, procurement, and construction contracts were renegotiated, costs had escalated some 85% to \$50 billion from \$27 billion. Project managers said that about \$5 billion of the cost overruns in Kashagan was due to laying down the subsea pipeline too early in the project's life cycle, in an effort to benefit from the contractual enticement to wrap up big segments first. That was an expensive decision, project managers said, because the pipeline corroded well before the project's completion.

All of these issues resulted from the best of intentions. Each of the key players in the Kashagan story was hoping for the best outcome, but the organizational incentives for bad behavior (amplified by the desire to tap into huge reserves while oil demand

and prices were expected to continue rising) hindered the path to success. Missing in this story were the culture, rules, and processes that would have encouraged more efficacious behaviors.

Saved by Low Oil Prices

Perhaps it is just human nature to pull in the reins and become more careful about spending wisely when earnings are tight. In any event, that is certainly what oil and gas companies do. As oil prices drop, capital expenditures decline as well—and therefore most of the bad behaviors energy companies exhibited to fast-track and maximize production for a market willing to pay top dollar become less pronounced.

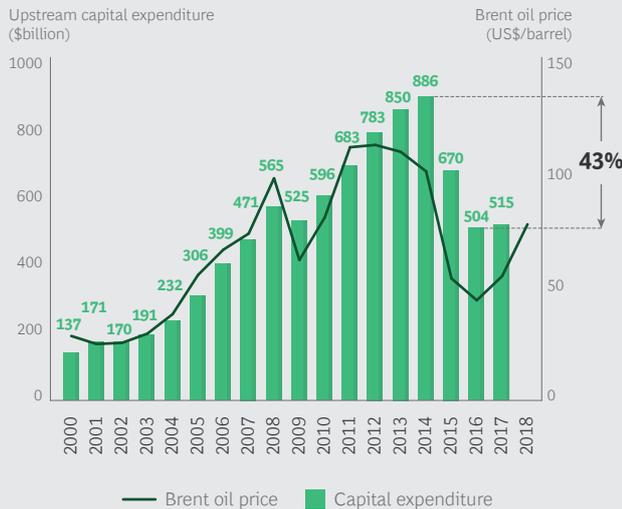
The drop-off in spending in a low-oil-price environment is dramatic. From 2014 to 2017, when the price of Brent Crude fell from more than \$100 a barrel to about \$50 a barrel, upstream oil and gas project expenditures tumbled more than 40%. (See Exhibit 2.) Some of this decline occurred because the project mix in energy companies skewed away from complex deep-water projects to simpler efforts, such as brownfield investments or shale production. As oil prices fell, the median project size and reserve sank by more than half.

But if this decrease in capital expenditures was attributed solely to energy companies' decreased ambition and appetite for investment when oil prices fall, a significant factor in this phenomenon would be neglected. Of equal weight at least was their tendency to react to lower prices by adopting a much more disciplined approach to exploration and development.

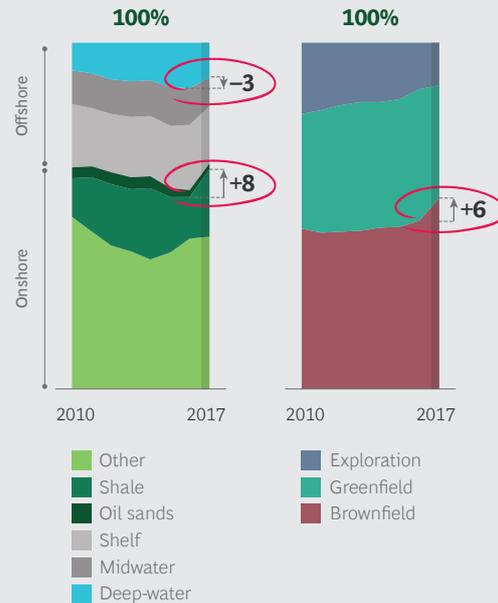
This renewed rigor comes about for a variety of intersecting reasons. For one thing, with less work to go around in a slower business environment, management has more time to focus on the company's slimmed-down project portfolio. Such oversight compels a greater degree of transparency (and, hopefully, fewer mistakes). And the more leisurely pace also affords additional time for structuring, planning, and optimizing the project from start to finish

EXHIBIT 2 | Capital Expenditures Drop When Oil Prices Are Low

Upstream oil and gas capital expenditure declined ...



... and investments skewed to shale and brownfield



Source: Rystad Ucube.

Note: Capital expenditure includes both exploration and development spending.

and for basing decisions on more input from less-harried internal experts.

Financial constraints also play a role. When cash is at a premium, each stage gate in the project faces tighter scrutiny. Rather than rubber-stamping stage gates, energy companies tend to require more thorough analysis and justifications before okaying the start of the next phase. As a result, in lean times project teams have an incentive to work closely with contractors to find creative ways to solve bottlenecks in order to keep projects alive through different stage gates.

Separate from but ultimately influencing cost discipline as well, oil price declines inhibit market opportunities for contractors. Consequently, their bids would likely be lower than during boom periods, and they would be more open to cooperation with oil and gas companies in order to drive the project to a satisfactory completion.

All of these elements contributed to the eventual success of the Johan Castberg offshore project in the Barents Sea. Statoil (now Equinor) launched the effort in 2012

when oil prices were sluggish and was able to cut the cost estimate by about 50% by downsizing the project scope, according to an article in *World Oil* magazine. In addition, Statoil was able to lower the estimate even more by leveraging its greater negotiating power with contractors, who were facing a more competitive market with decreased demand for oil and gas development projects, the article noted.

Back to the Future

Oil and gas companies would do well to bear in mind the discipline that they showed during the recent bout of lower prices. But memories are short, and as prices recover, energy companies may have difficulty keeping their focus on value optimization and project discipline. One thing is certain, though: even in the current uncertain environment, oil prices have trended upward enough that capital expenditures are already on the rise. In just the past two years, three of the eight largest oil companies have added to their capital expenditures budgets. By comparison, from 2013 to 2016, all eight lowered their capital

expenditures, even though four of them increased production.

And as the spending increases, companies will face increasingly adverse conditions. These include more complex projects to manage; greater demand for engineering and construction services, which in turn drives up the cost of labor, materials, and supplies and boosts the bargaining power of contractors; and a potential shortage of skills for overseeing large exploration and development projects because of downsizing earlier in this decade.

This laundry list of challenges notwithstanding, energy companies are not without solutions. In fact, we believe that poor project performance is driven mostly by problematic internal behaviors and culture in an organization that are correctable—for example, the wrong structure and processes for managing projects; bad decision making and communication channels between management and project leaders; and KPIs and metrics that lack clarity and rigor. Such flaws in operations undergird repeated problematic behavior, but they can be overcome.

Energy executives should start by asking themselves four critical questions:

1. How do we encourage virtuous behaviors? The answer lies in slimming down stage-gate processes by removing prescriptive requirements, generic templates, and standardized thinking. Instead of taking this rote approach, each project team should base decisions on a project's unique primary value drivers.

Then, at the beginning of each project phase, the project team and company management should reevaluate and reach a consensus around their decisions, thereby eliminating the more typical arbitrarily imposed top-down bureaucratic project requirements. The goal is to allow good and rational behaviors to predominate. Consider transparency, for example. Everybody is aware that it's essential to be consistently candid and honest about a project's evolution from the very beginning. At the same time, there are any number of overarching

reasons not to be transparent: employees may fear that their managers will punish them if they are viewed as creating problems by raising concerns; the company's contractors may use any disclosed information against the organization in arbitration; external stakeholders may be spooked by open discussion of potential issues. Any one of such things could diminish support for the project. That's how individual rational behaviors sometimes can lead to a collective disaster—an outcome that potentially can be mitigated by focusing decision making on value drivers.

2. How do we best collaborate with contractors? Energy companies should be deeply involved with project delivery and avoid the trap of becoming passive monitors, problematically giving most of the control to the engineering and construction company after the contract is signed. In fact, we think that the contracts themselves hinder collaboration, because once the scope, areas of responsibility, and payment schedules are locked down, contractors naturally are focused on satisfying their own interests and anticipated profit margins, irrespective of project outcomes.

While contracts are here to stay, energy companies must change the dynamic so these agreements are not treated as the dominant drivers of a project. Project owners therefore should be actively engaged in all aspects of the effort through an ongoing shared understanding of the project's critical path with contractors, working together to identify roadblocks and craft solutions to navigate around them. Project and contractor teams should be located on or near project sites, make decisions by consensus, and celebrate collective success. To avoid jeopardizing these collaborations with possible policy complications arising from the work agreement, contract-related tasks such as legal claims, invoicing, payables, and receivables should be handled by other teams working at a distance from the on-the-ground project management effort.

3. How do we increase efficacy in project scheduling? Early on, companies should make independent, dispassionate analyses

of the project schedule. From this, they can set realistic timelines, mitigate project risks before anything goes wrong, have a clear view of the possible areas where accountability and responsibility may break down, and prioritize resources for these potential trouble spots. Note that schedules should be viewed not as a succession of dates but rather as a realistic model for gauging progress and forecasting completion of an industrial project. Getting an accurate picture of the project's timeline, therefore, requires embedding intrinsic risk uncertainty in the scheduling model via, among other things, stochastic and Monte Carlo simulations.

4. As oil prices recover, how do we maintain focus on value creation? Oil and gas companies should make sure that value improvement processes are applied consistently and maintained rigorously—that is, not diluted by taking shortcuts or making bad engineering decisions to meet an aggressive, arbitrary schedule. This can be a

difficult task since it involves a sharp change in the oil and gas corporate mindset—namely, instilling a culture of responsibility so that value creation becomes part of the company's DNA. And it requires new, creative ways of collaborating with contractors to jointly explore avenues of unlocking value that's centered on cost-effectiveness, realistic yet disciplined schedules, and fewer surprises during the project's life cycle.

Given its boom and bust cycle, the energy industry has good reason for optimism as oil prices return to higher levels, even as they take a bit of a jagged path to get there. But wise oil and gas companies will approach this positive period with caution and not the undisciplined capital project management behaviors that boom cycles tend to elicit. Companies that proceed with discipline will find they can enjoy their cake during the upturn and eat it, too—even when the inevitable downturn hits.

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