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Bend, Don't Break

How Shale Operators Can Survive Volatile Commodity Prices



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How Shale Operators Can Survive Volatile Commodity Prices

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AT A GLANCE

Following an extended period of strong financial performance, North American shale operators find themselves in retrenchment mode, weighed down by a substantial decline in oil prices and the absence, to date, of a meaningful and sustained recovery. They must strike a balance between doing what is necessary to negotiate today's challenging environment and preparing themselves for the future.

HUNKERING DOWN WHILE BUILDING FLEXIBILITY

Operators have taken a range of defensive measures in response to the current challenges, including reducing head count and capital expenditures. The risk is that such moves will leave these companies ill prepared for tomorrow's competitive arena, one likely to be highly volatile and to demand considerable flexibility.

FOUR MUST-HAVES FOR SUFFICIENT FLEXIBILITY

To thrive in tomorrow's market, operators will need the ability to adjust production not just quickly but efficiently. This will require four distinct capabilities: operating rules that provide a blueprint for flexible operations and a flexible organization; a responsive supply chain that can adapt to changing market conditions; a culture that institutionalizes acquired knowledge; and dynamic staffing capabilities, supported by digital technologies, that enable and support a flexible workforce.

FOLLOWING A MULTIYEAR RUN of soaring output, surging revenues, and strong gains in production efficiency, companies engaged in the development of North American shale oil and gas find themselves in retrenchment mode, weighed down by the substantial decline in oil prices that began in mid-2014 and the absence, to date, of a meaningful and sustained recovery. Operators have abandoned earlier growth plans and cut spending materially, largely by reducing head count and scaling back capital expenditures. Some players have also financially restructured to reduce debt.

While such defensive moves make sense under the circumstances, they could pose longer-term risks. Reductions in head count could lead to the loss of critical institutional knowledge, putting companies' hard-won gains in operational efficiency at risk. Restraints on spending will curb their investment in new technologies, including ones that could deliver significant improvements in cycle time, asset recovery, and spending efficiency.

Shale operators have a difficult balance to strike. They must do what is necessary to negotiate today's highly challenging environment. Simultaneously, they must maintain the gains they have made in operational efficiency and position themselves for tomorrow—a tomorrow that stands to be highly volatile. Operators can achieve this balance through a combination of actions: investing selectively in new technologies; focusing on developmental opportunities that have long lead times; codifying their standards and processes; and, critically, working to become more flexible organizations, ones that can ramp up or ramp down their business quickly and effectively in response to changing market conditions.

From Tailwind to Headwind

North American shale operators were beneficiaries of a largely favorable backdrop from 2008 through mid-2014. Prices for natural gas remained depressed during most of the period, weighed down by surging supply. But prices for liquids, including crude oil, remained relatively high, with West Texas Intermediate crude oil generally trading above the \$90 mark.

Powered by this high-oil-price environment, most players enjoyed strong financial returns throughout the period. Companies' internal rates of return for oil wells in the Permian Basin, the Bakken Shale, and the Eagle Ford Shale, for example, hovered between 40% and 50%. These returns were aided greatly by operators' significant strides in minimizing well costs and cycle times and maximizing throughput.

Operators must negotiate today's highly challenging environment while maintaining the gains they have made in efficiency and positioning themselves for tomorrow.

(See *Beating the Best: Eight Characteristics of Winners in the Shale Arena*, BCG Focus, April 2015.) Propelled by favorable economics, operators aggressively expanded their development efforts, drilling more than 20,000 wells in the US and Canada in 2014 alone. Shale oil and gas production grew from 3.6 million barrels of oil equivalent per day (mboe/d) in 2010 to 15 mboe/d in 2015.

Companies' fortunes shifted in mid-2014, however, when oil prices began their extended slide.¹ As the price environment continued to worsen and project returns plunged, players increasingly hunkered down, focusing less on long-term growth and more on cost cutting and short-term survival. (See Exhibit 1.) They narrowed their focus to the most profitable basins and acreage, for example, and reduced or idled activities elsewhere. Both ExxonMobil and QEP Resources, for instance, decreased their activities in the Bakken Shale while increasing those in the Permian Basin. Operators did the same within individual plays, focusing on targets with the most favorable economics, a process known as high grading.

Operators took action on other fronts as well. They reduced their capital expenditure budgets significantly: capex for US-based shale operations fell from \$152 billion in 2014 to \$46 billion in 2016. These cuts are evident in sharp declines in rig counts and the number of wells drilled. (See Exhibit 2.) The number of rigs in the US fell from a peak of 1,931 in September 2014 to 634 in December 2016. The number of wells drilled annually fell from 20,797 in 2014 to fewer than 7,000 in 2016.

Shale operators have also made substantial reductions in head count. Across the US energy landscape, more than 250,000 jobs were eliminated in 2015, including upwards of 60,000 in the shale-rich plays of Texas alone. Another 15,000 cuts were announced in 2016. Independent players operating in major basins have trimmed staff significantly; majors such as ConocoPhillips have likewise announced large workforce reduction programs. Reductions in drilling and completion activity have led to sizable cuts in head count at services companies engaged in the development of shale reservoirs as well. Schlumberger, for example, has cut roughly 50,000 jobs from its workforce.

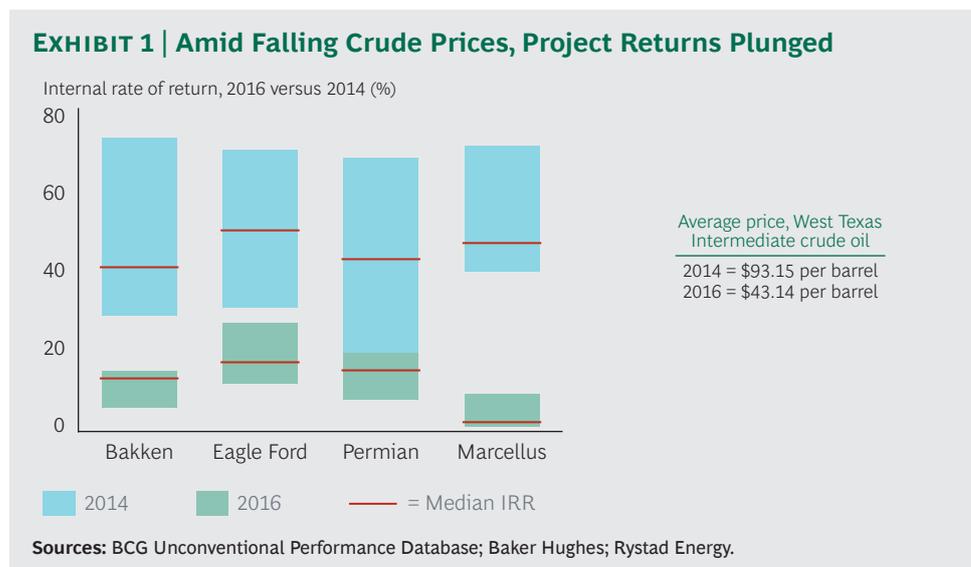
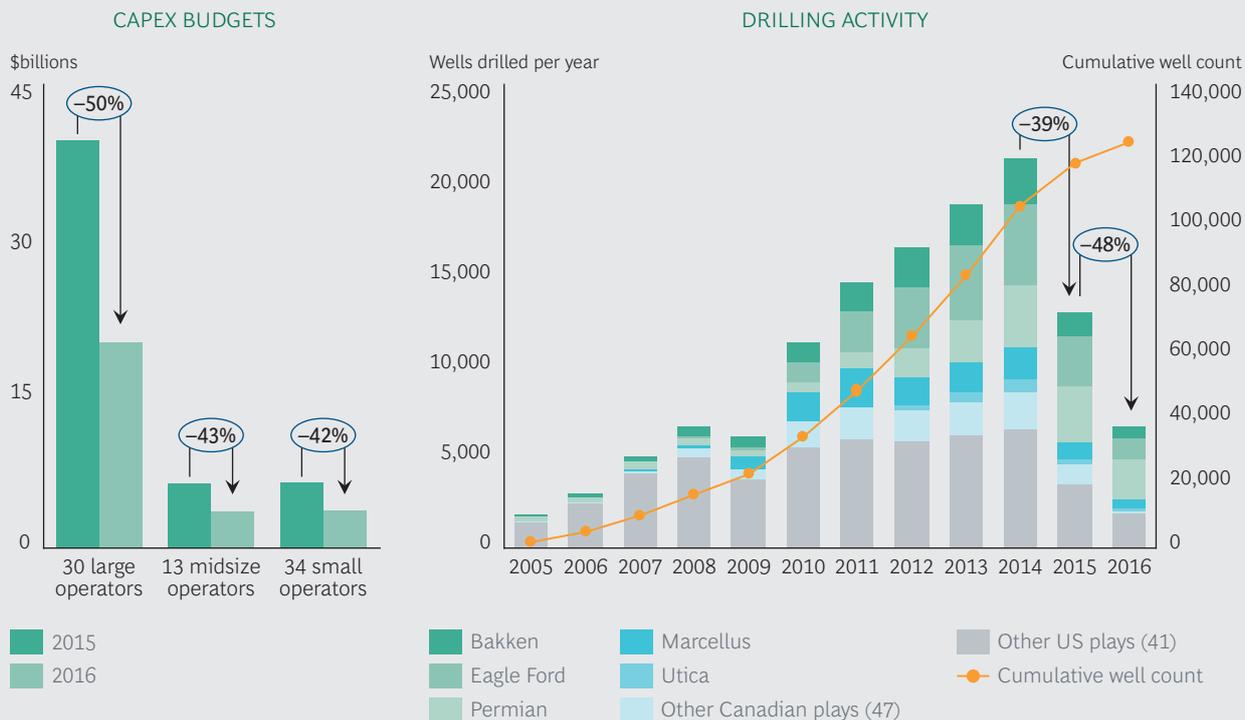


EXHIBIT 2 | Operators Significantly Reduced Capital Expenditures and Drilling Activity



Sources: Rystad Energy; BCG analysis.
 Note: Capex is for shale operations only.

Additionally, operators have rationalized and restructured their relationships with suppliers, forcing them to dramatically lower prices. (See Exhibit 3.) Reductions across major cost categories, such as drilling and pumping, and minor ones, such as chemicals and sand, range from 20% to 50%. Our benchmarking indicates an average one-time price reduction of approximately 30%, an amount close to some suppliers' marginal cost.² This decline in pricing power is evident in suppliers' financial results. Schlumberger, for example, saw its operating margin fall from 20% in fiscal year 2014 to 8% in fiscal year 2016. Operators have also significantly pared back the number of vendors that they use—our benchmarking indicates an average reduction of about 65% since the plunge in oil prices began—concentrating their spending on fewer suppliers in an effort to better leverage scale.

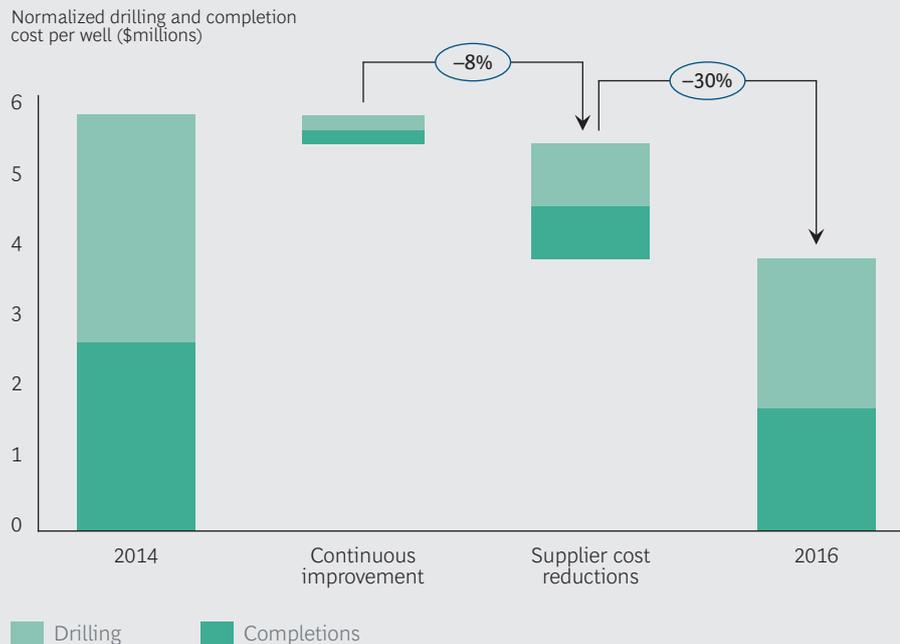
Again, such moves are warranted. But operators need to do more. Otherwise, they risk finding themselves unprepared for the next phase of the shale cycle.

Weathering Today's Challenges While Preparing for Tomorrow's

Operators have made impressive gains in efficiency during the past several years. From 2012 through 2016, the average estimated ultimate recovery, or lifetime production, per shale well grew from 530 to 717 mboe, or 35%. Simultaneously, the average capital expenditure per barrel of oil equivalent fell 23%, from \$13.25 to

EXHIBIT 3 | Operators Have Forced Suppliers to Lower Prices

ONE-TIME REDUCTIONS IN SUPPLIER PRICES HAVE DRIVEN DOWN OPERATORS' COSTS



Source: BCG Unconventional Performance Database.

Note: Cost data based on horizontal wells in the Bakken, Eagle Ford, Permian, and Marcellus formations and normalized by completion cost per stage and drilling cost per foot based on 2014 well configurations.

\$10.21, and drilling efficiency rose, with the average number of drilling days per well falling more than 30%.

The challenge for operators will be to maintain these gains in the face of the large-scale cost cutting and reductions in activity that the industry has undertaken, and to do so while actively preparing for an unpredictable future. One way operators can do this is by exploiting, or continuing to exploit, the “factory model” approach to operations that several top-performing operators have embraced. Based on the use of standardized designs and simple, “minimum sufficient” processes, this approach facilitates the development of wells with maximum speed and efficiency. It enabled one operator, for example, to cut its cycle time for a typical eight-well pad by half.

To leverage the factory model approach to its fullest, operators must continue to codify their processes, standards, and bases of design. As the industry has pulled back, many drilling and frac crews have lost their jobs, with only the top crews remaining employed. Codification of best-practice standards and processes will help operators replicate these levels of performance when industry activity, and the number of crews, pick back up. Operators should also maintain a balanced inventory of sites that are “ready to drill” and “ready to frac” in order to preserve gains in cycle time efficiency. Industry-wide drilling activity across North America fell 64%

from its peak in 2014 to the end of 2016; the inventory of wells that have been drilled but remain uncompleted (DUC), or unfracked, has likewise fallen and continues to fall. As the number of DUC wells decreases, the risk grows that operators could be forced to scramble to ramp up production when the industry's fundamentals improve, driving up capital expenditures considerably.

Further, to derive maximum value from the factory model approach, operators should identify and prioritize activities that have long lead times—such as geologic analysis, infrastructure development, and the creation of land development plans that include the necessary permitting—and invest selectively. This pick-and-choose approach will leave operators better positioned to move quickly when oil prices recover or particularly attractive opportunities emerge. It will also allow these businesses to make the most of finite investment funds in today's environment of constrained cash flow.

In concert with the factory model approach to operations, operators should balance today's needs with tomorrow's by making changes to their procurement practices. Critically, they should seek to form long-term strategic partnerships with key service providers; such partnerships will allow operators to adjust quickly to changes in the market and can significantly lower their costs over the full development life cycle. Operators should also try to lock in today's favorable prices. At the same time, they should take a long-term view and structure relationships in a way that does not threaten the longer-term viability of suppliers and that creates a foundation for a shared brighter future.

Finally, operators should continue to evaluate and deploy innovative technologies that can enable continuous improvement in performance and lower operating costs in such areas as drilling, well completion, and facilities management. Such technologies include dissolvable frac plugs, which have the potential to replace costly, labor-intensive composite plugs that must be drilled out after the fracking stage. Costs for these dissolvable plugs are currently relatively high but will fall as the technology, which is still young, evolves. Industry adoption of the plugs, which have the potential to reduce well costs significantly, is still nascent but growing—BCG's Unconventional Performance Database indicates that they are currently used in 10% to 20% of new wells, compared with a 1% utilization rate in 2013 and 2014.³

Four Must-Haves for Sufficient Flexibility

Given the region's ample shale oil reserves and regional producers' potential to adjust production levels quickly, North American shale oil is likely to represent the global oil market's marginal barrel for the foreseeable future. Indeed, the region has enough reserves to maintain current levels of production at known formations for at least 15 years, with the development of these reserves profitable for operators at \$60 to \$70 per barrel.⁴

For operators, there is thus a considerable premium attached to having the flexibility to adjust production not just quickly but efficiently. Developing this flexibility will require four distinct capabilities—capabilities that also figure prominently in the organizational effectiveness of a variety of organizations outside of the industry.

Operators should identify and prioritize activities that have long lead times—such as geologic analysis and infrastructure development—and invest selectively.

Forging stronger relationships with contractors can help operators gain early access to promising new equipment and technologies.

Operating Rules That Form a Blueprint for Flexible Operations and a Flexible Organization.

Companies must have a clear understanding ahead of time of the activity levels that make sense at different commodity prices, as well as an understanding of the steps necessary to maximize operating efficiency at those levels. Companies should consider creating development plans that include trigger points for changes in activity level based on the economics of the land, the current pricing environment, and available inventory. These plans should also include instructions on how to transition between one activity level and another. To support these efforts and enable the necessary flexibility amid changing activity levels and commodity prices, companies must communicate and form partnerships with strategic suppliers.

A critical element of this approach is discipline. In particular, operators must resist the temptation to drill in many areas simultaneously when prices are high. They must also select investments very carefully when prices are low and when there are cash flow constraints.

Manufacturers offer a model for how an approach based on the use of trigger points to signal changes in capacity can work. Best-in-class manufacturers are highly methodical and forward thinking on this front. Before opening a new plant, they conduct a detailed analysis and have a clear cutoff point that takes into consideration different economic variables. Once they make the “go” decision, they commit fully to it—they would not, for example, open one end of a production line or part of a factory without adding all the equipment necessary to create a finished product. They bring in experienced personnel to lead the new operation and bring it online smoothly. Before closing a plant, they weigh the cost benefits of doing so against the potential economic effects of lost skilled labor and disruption of operations, as well as the impact on long-lead-time deliverables and the company’s future growth. The analogies with operators’ decisions to establish, expand, or curtail operations are direct.

A Responsive Supply Chain That Can Adapt to Changing Market Conditions. As touched on above, operators should design contracts that are mutually beneficial to themselves and to third parties. Forging stronger relationships with contractors in this manner can help operators gain early access to promising new equipment and technologies as well as to the best crews. Interviews with suppliers show that these companies are likely to concentrate on their best customers as the industry recovers; operators should strive to ensure that they are among their suppliers’ preferred partners.

In designing contracts with suppliers, operators should consider compensation structures that are based on commodity prices and associated activity levels so that the interests of both parties are aligned. They should also proactively communicate planned changes in activity levels so that contractors can staff appropriately under terms that are financially advantageous to them.

At the same time, operators should look out for their own interests. In particular, they should avoid take-or-pay contracts that penalize them for work not performed or delivered, unless such contracts are absolutely necessary. The industry’s downturn has revealed the disadvantage of such contracts; operators must model their

costs under a range of assumptions to make sure that they fully understand the risks before entering into any type of agreement.

As they work to secure flexible supply chains, operators can take a page from companies such as UPS and FedEx, which substantially ramp up their capacity around the Christmas holidays. These companies plan well in advance for their labor needs, allowing them to secure labor at far lower rates than they would pay if they had to hire under duress. They have also formed advantageous relationships with approved vendors for such contingencies as bottlenecks in delivery due to a shortage of available trucks.

Shale operators could emulate these practices or variants thereof. They could, for example, find structural ways to keep development teams in place for specific land developments; identify vendors that can provide backup in the event of contingencies, such as shortages of sand; and deploy contract engineering firms to help them work through bottlenecks in getting wells drilled and online.

Successful operators also stress test ramp-ups and ramp-downs of capacity in their development plans in order to identify bottlenecks and critical-path tasks and requirements, such as well permits. They avoid knee-jerk responses to price swings. They aim to consistently add manageable amounts of activity to the “factory” in an effort to maintain consistent cycle times and ensure that there are no hiccups between the different steps, such as the handoff from drilling to well completion.

A Culture That Institutionalizes Acquired Knowledge. As the industry’s workforce turns over, the codification of crucial operational information, and the ability to effectively transfer knowledge to new employees, will be critical to ensuring flexibility and adjusting operations quickly and effectively. The ability to maximize efficiency in the performance of tasks, whether through outsourcing, automation, or the minimization of skilled personnel necessary to perform a given task, will also be key.

Many companies from outside the industry are already quite advanced in this domain. Many retail and technology companies, for instance, use simulation-based training (also known as “gamification” in the technology industry) to speed employees’ absorption of new information. The US military leans heavily on its most experienced operators to quickly train new recruits, rotating these operators through its training centers. Similarly, companies in health care bring experienced pharmacists and pharmacist technicians into their call centers to enable the “downskilling” of some tasks to semiskilled workers.

A critical enabler of these efforts in the shale industry is the advent of digital technologies that can cheaply collect, analyze, and disseminate data in near-real time. One operator we spoke with, for example, is using cheap “smart” sensors, rather than slow, expensive, bespoke process controls, to monitor tank levels. The sensors were deployed in a mere few months through a service cloud-based contract and have considerably reduced the company’s need for skilled operators.

Dynamic Staffing Capabilities, Supported by Digital Technologies, That Enable and Support a Flexible Workforce. Operators must employ an HR model that is suited

Operators can take a page from companies such as UPS and FedEx, which plan well in advance for their labor needs, allowing them to secure labor at far lower prices.

to the changing needs of the business. Companies can no longer plan for a relatively static environment in which operations require, say, a median of six drilling engineers per rig line. Instead, they must consider what it will take to maintain operations at different activity levels. What degree of engineering support will be necessary and affordable when oil is priced at \$40 per barrel—or \$70 per barrel? How can we use new digital technologies to give us the necessary flexibility without having to hire?

In practice, this means that operators must find ways to strategically ratchet talent up and down. To accommodate lower activity levels, they may need to offer employees flexible and part-time work arrangements, including unpaid leave with benefits. Companies must be similarly creative in order to ensure that they have sufficient talent available for higher activity levels. One way to do this is by creating training programs that leverage the talents of the few experts in the company's ranks while enforcing the rigorous standards and bases of design that were previously codified (as discussed above). Such programs can greatly accelerate the learning process when it is time to hire new staff or bring on additional contractors.

Technology plays a role here. Automated rigs, for example, have allowed companies to substantially reduce the number of rig hands they employ over the past ten years, while simultaneously increasing safety. Aerial mapping tools have allowed facility engineering teams to plan pipeline routes and pad sites with fewer field visits, lower costs, and better engineering accuracy. The best companies string these technological innovations together into a streamlined workflow and build them into their staffing model.

THESE ARE TRYING times for shale operators in North America, and companies are in defensive mode. But there are steps that businesses can take that will significantly strengthen both their current position and their potential to rebound strongly once the cycle turns. Companies that seize the reins stand to be rewarded with a material competitive advantage over peers that remain hunkered down.

NOTES

1. For some operators that had hedged production, there was a time lag between the drop in oil prices and significant cutbacks in their activities, accompanied by a wait-and-see attitude and hopes for a quick oil price recovery.
2. Squeezing suppliers' margins could ultimately backfire on operators. Suppliers have been a source of innovation and a partner in fostering lean operations. By driving suppliers' margins into negative territory, operators run the risk that they will reduce capacity, leading to a loss of critical knowledge and hindering suppliers' (and operators') ability to grow when activity and prices recover.
3. BCG's Unconventional Performance Database consists of comparative financial and operational performance data for many companies operating in North American shale basins.
4. The industry could ramp up production quickly and substantially. Assuming current cycle times, if 50 operators each added two rigs per year, commencing pad development on the first of the year and having initial production online by October of that year, they could collectively produce a million barrels of oil equivalent per day—more than 1% of total global demand—by the end of the following year.

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3/17



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