Drilling Down

Stress testing: Anticipating extreme events in the oil and gas sector

In this edition of KPMG Global Energy Institute's *Drilling Down,* we asked Brian O'Neal and Patrick Wagner about establishing a robust stress-testing regime.

In the absence of a regulatory requirement, why should energy companies be proactive about establishing a stress-testing program?

Most energy executives probably agree that their organizations can juggle multiple risks. They can hedge volatile market prices directly or by proxy, manage counterparty default risk through an effective credit function, and store materials against expectations of demand surges.

Unfortunately, the energy industry also faces risks which are either unmanageable, barely manageable, or in some circumstances, difficult to anticipate. Consider trying to manage a large position in an unhedgeable commodity in a location controlled by a competitor; persistent feedstock price increases placing a burden on cash flow and credit availability; or an unexpected change in regional renewable credit requirements.

These events are not easily forecasted, and most market risk models (e.g., Value at Risk) are not properly configured to capture the probability and magnitude of their occurrence. Stress testing is one of the only ways to determine a company's true sensitivity to extreme events.

Companies that can react quickly and confidently to these sudden changes in operating environments have an advantage; those that cannot may find their very survival at risk. So, even though the industry does not have the banks' regulatory requirement to build a robust stress-testing regime, it is definitely in energy companies' best interest to do so.

What are some of the risks potentially hiding in energy companies or portfolios that stress testing might bring to light? What events haven't they anticipated?

Some risks are common to normal operations, but difficult to measure. For instance, most Value-at-Risk engines do a very poor job of measuring the risk inherent in large spread positions, such as being net long one year and net short the following.

Other risks are easily conceived, yet difficult to model with any certainty. For instance, if a sudden drop in market liquidity is followed by a rapid decline in asset values, loan covenants may be breached, margins may be called, and a company may be forced to raise cash at the most inopportune time.

Still other "what if" risks are far-fetched, but worth considering for the sake of contingency planning. For instance, what would happen if an entire industry segment within a client portfolio collapsed? What if global GDP went into negative growth territory for multiple years? What if a sudden and well-funded adoption of disruptive technology created an unexpected shift in demand patterns?

In each case, it is easy to say "it won't happen," "it is not likely to happen," or "if it does happen, we are all toast." All of those approaches are short-sighted and preclude a better, more interesting outcome. When companies are knowledgeable and prepared, they allow themselves the opportunity to survive, and maybe even prosper, in difficult times.

What are some of the variables energy companies need to consider in order to evaluate risk and preparedness?

A robust stress-testing program should consider a wide variety of risk types and modeling methodologies to help understand those risks.

The most common risk types in existing stress-testing regimes are the obvious ones: market price, volatility, volume, and credit quality. There are also risk types which are often modeled by companies' commercial organizations, but not necessarily included in their stress testing: correlation between commodities and time periods, market depth, capital liquidity, and the like.

Finally, there are situational risks which are rarely addressed outside of the highest-performing companies, including large-scale market abuse, macroeconomic shifts, regulatory changes and sanctions, sudden technological improvements at competitors, and dramatic demand reduction.

> **"Stress testing is one of the only ways to determine a company's true sensitivity to extreme events."**

While the number of potential risks may seem daunting, an effective stress testing function will take the time to consider the risks most relevant to the business, narrow its focus to a practical number of circumstances, and then challenge itself to think through the improbable. Interestingly, this is one area in which "industry standard" scenarios are not particularly helpful, since a singular focus on a set of risks creates its own system risk. As such, leading practitioners will take the time to consider both the "standard" risks and their own unique operating circumstances in order to effectively prepare for adverse events.

Once the initial stress testing is complete, how can energy companies put the findings to work for them?

Once the testing is complete, the single most-important activity is clear communication.

Placing a dense, highly technical report in front of a broad audience is not only unhelpful, but it may also erode the organization's confidence in the stress testing exercise. It is absolutely critical that the testing results are conveyed in a manner that is easy to understand, tied to each company's unique business circumstances, and actionable.

Decision-makers need a full understanding of the testing's analysis in order to develop effective strategies and make proper choices. If the communication is clear, the next important step is a simple one: act on it. Build a contingency plan and empower the organization to operationalize the plan when the need arises.

What are the elements of a sophisticated stress-testing program?

Since the banks were essentially forced to improve the state of stress testing on a global basis, energy companies should be able to benefit from recent advances made to satisfy regulatory requirements. These advances occurred both in technology platforms and modeling techniques.

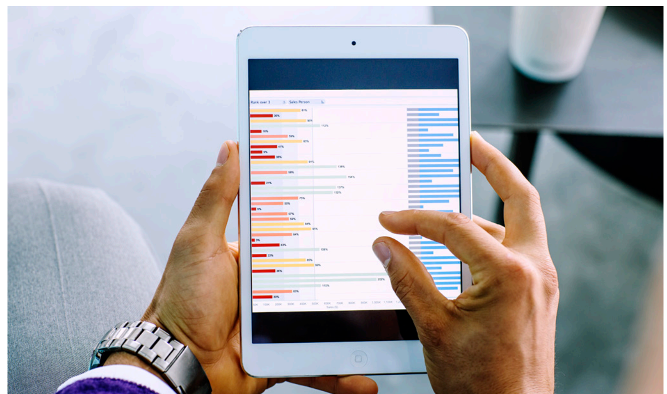
These technology platforms often include parallel processing to reduce run-time, the ability to select local cloud-based platforms, big-data capabilities, and intuitive user interfaces with user-defined criteria.

The modeling techniques include the use of advanced analytics such as dimension reduction, time-series analysis, and enhanced simulation to generate joint distributions of variables.

Enhanced simulators also allow users to forecast a large universe of macro-variables and preserve both the dynamics of individual variables and the interdependence structure between them. These methods allow expert judgment to be applied, especially in situations where data scarcity would otherwise create modeling problems.

The most important advancement in modern stress-testing is probably the scale of the test itself. Long gone are the days of "an X% increase in Y results in a Z% decrease in earnings." Modern stress-testing methods can now be applied to the entire organization, including financial statements, budgeting and planning tools, and capital planning processes.

By using enhanced computing power and big-data capabilities to model the entire organization, stress testing can quickly move from an abstract earnings exercise to a granular planning mandate.



About the GEI

The KPMG Global Energy Institute (GEI) is a worldwide knowledge-sharing forum on current and emerging industry issues. Launched in 2007, the GEI interacts with its over 30,000 members through multiple media channels, including audio and video Webcasts, publications and white papers, podcasts, events, and quarterly newsletters. To become a member visit www.kpmgglobalenergyinstitute.com.

Contact us

Brian O'Neal
Principal, Risk Analytics
KPMG LLP (U.S.)
T: 713-319-3865
E: boneal@kpmg.com

Patrick Wagner
Manager, Risk Analytics
KPMG LLP (U.S.)
T: 713-319-2906
E: pwagner@KPMG.com

www.kpmgglobalenergyinstitute.com
www.kpmg.com

Some or all of the services described herein may not be permissible for KPMG audit clients and their affiliates.

kpmg.com/socialmedia