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FROM BLOOMBERG  
BUSINESSWEEK  
RESEARCH SERVICES

# Big Returns from Big Data in Energy and Process Industries

Energy companies are using real-time data and analytics to solve key challenges in hotly competitive global markets.

BY JOE MULLICH

**M**ost companies in the oil and gas (O&G), utilities and chemical process industries benefit significantly from global markets. But they also face pressures that demand instant response to fast-paced international events—volatile fuel prices, energy-efficiency program mandates, carbon tax

implications, greater competition, supply chain risk and growing regulatory requirements, to name a few.

As competitive and financial pressures rise, the energy industry is looking toward big data and new analytics tools and techniques to address their most pressing issues. According to a 2013 study from Tata Consultancy Services titled “The Emerging Big Returns on Big Data,” companies in the utilities and energy/resources industries have the highest expectations for generating returns on their big data investments than firms in any other industry (see Figure 1, “Betting Big on Big Data”). The key is to leverage their great stockpiles of information quicker to glean new insights from data rapidly.

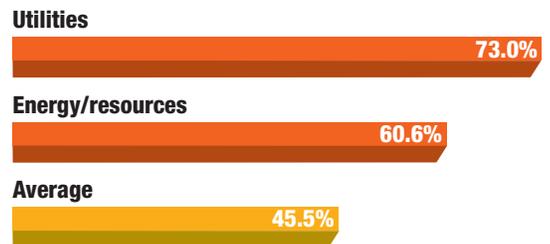
And those insights are coming in a growing number of areas, thanks largely to new business models made possible by in-memory computing. This relatively new technology enables existing data to be analyzed much faster and encourages the correlation with new data sets. The result is business insight not available until recently.

## Profitability Comes First

The relentless search by O&G, utilities and the chemical industry for profitability and cost optimization, driven by their use of analytics, is widespread. Consider The Dow Chemical Company. The Midland, Mich.-based company uses thousands of predictive models that run through every aspect of its operation to improve profitability. Business units, supplied with real-time data, know by the middle of the month whether they will hit monthly performance targets, which enables them to adjust strategies. The chemical giant uses exchange-rate margins analysis to determine where to buy raw materials and how to price products.<sup>1</sup>

## FIGURE 1 Betting Big on Big Data

Process companies in the utilities and energy/resources sectors lead the pack of global industries in expected big data investment returns. (mean percent of expected return in 2012)



Base: Survey of 1,200 executives in global companies in North America, Europe, Asia-Pacific and Latin America

Source: Tata Consultancy Services

“Predictive analytics, which are built on large data sets, have the ability to spot meaningful divergences from expected results, enabling companies to anticipate changes in markets and their environment,” notes Robert Kugel, an analyst at Ventana Research. “More decisive management styles will evolve from using big data with in-memory analytics.” He says process companies are only skimming the surface of the potential of analytics. A study by the consulting firm found a mere 12 percent of all manufacturers are functioning at the highest innovative level of maturity in their use of analytics.

But that is changing as demands for their products rise. Companies that can quickly decipher big data sets, such as 4D seismic data, can reduce their cost and risk—and move faster into new markets. For example, an October 2012 Accenture report titled “The Looming Global Analytics Talent Mismatch in Oil and Gas” put it this way:

1. Henschen, Doug. “Dow Chemical Moves Analytics Into Mainstream.” *InformationWeek*, September 12, 2012. <http://goo.gl/qAw1R3>

“We need to not just think about the past, but predict the future. And that depends on having data transparency so supervisors can drill down to the slightest deviation.”

—JASSIM AL MOHANNADAI, ONSHORE OPERATIONS MANAGER, QATARGAS

“For oil companies moving into unconventional plays like shale gas, analytics can be used to model the essential geophysical features and production data of each well.”

### Better Maintenance Management

In capital-intensive industries, maintenance issues can have huge financial ramifications. GlobalData, a U.K. consulting firm, estimated that capital expenditure in O&G increased by 13 percent last year, reaching \$1.03 trillion globally.<sup>2</sup> To slow down this daunting growth rate, energy companies are increasingly taking a new view to maintenance. They are going beyond the timetables from manufacturers and using predictive analytics to anticipate—and prevent—equipment failure.

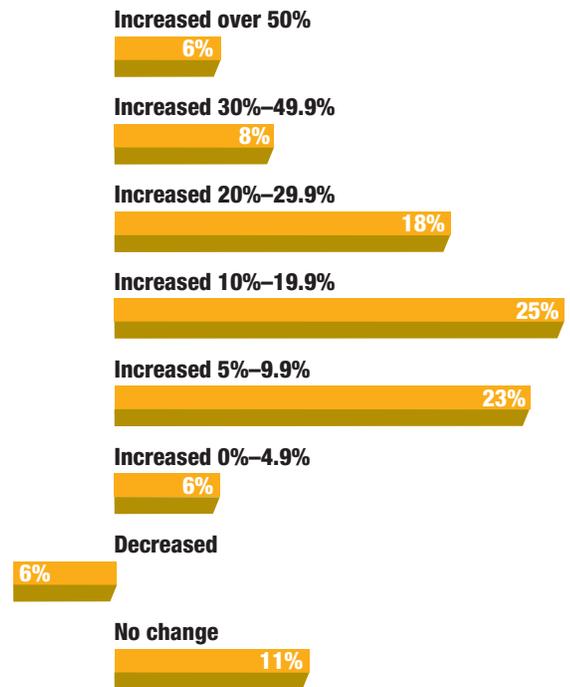
For example, Nexen, a Canadian O&G company based in Calgary, uses predictive analytics to determine when offshore oil rigs need cleaning or replacement. “With time-based maintenance, you might change a seal on a pump every two or three years so that it would not fail,” says Marjorie Chamberlain, a reliability specialist at the company. “Instead, you can employ predictive techniques for condition monitoring to see when that starts to degrade, and then you can change it out so that you’re not just pulling it apart for the sake of it.”<sup>3</sup>

Qatargas, the world’s largest liquefied natural gas producer, is using predictive analytics with in-memory computing for better performance in cutting operational maintenance costs.<sup>4</sup> Jassim Al Mohannadai, Onshore Operations Manager at the Doha, Qatar-based company, says it processes 3,000 work orders a month. Using in-memory technology he says Qatargas will be able to rapidly analyze 15 years’ worth of maintenance data. “We need to not just think about the past, but predict the future,” Al Mohannadai says. “And that depends on having data transparency so supervisors can drill down to the slightest deviation.”

Houston-based CenterPoint Energy is a Fortune 500 electric and natural gas utility serving several markets in the United States. Its Smart Grid project involves an advanced metering system and Web portal accessible to over 2.2 million customers. Corporate technology officer Steve Pratt says analysis of Smart Grid’s real-time information has impacted efficiency and reduced costs. “We used to read 88,000 meters a day manually and now

### FIGURE 2 Moving Up the Risk Analytics Maturity Curve

In the past year, how has your investment in predictive analytics technologies, specifically those for managing risk, changed?



Base: Survey of 465 managers and executives at chemical companies in all major geographic regions

Source: Accenture 2012 Risk Analytics Study

can gather 221 million readings a day without people,” he says. As a result, CenterPoint figures it has avoided three million unnecessary service calls, which cost roughly \$75 apiece—a huge savings.

### Betting Big on Risk Management

A growing number of energy companies have embraced analytics across the board to improve operational integrity. But it is the potentially big payoff in risk management that has boardrooms focused on predictive analytics. In fact, a 2012 Accenture study found that about half of chemical firms have increased their investment in risk analytics by 5 percent to 20 percent (see Figure 2, “Moving Up the Risk Analytics Maturity Curve”).

Like most utilities, Alliander, a regional grid operator for gas and electricity in the Netherlands, must grapple with unpredictable demand due to rapid changes in consumption patterns. The energy landscape is being

2. Clark, Lindsay. “Predictive analytics used to cut costs in oil sector.” *ComputerWeekly.com*, February 23, 2012. <http://goo.gl/lxqX3p>

3. Clark, Lindsay. “Predictive analytics used to cut costs in oil sector.” *ComputerWeekly.com*, February 23, 2012. <http://goo.gl/lxqX3p>

4. SAP. “Increase Competitive Advantage with Predictive Analytics.” Video. <http://goo.gl/pmeVvB>

“If we know what our costs are going to be, our procurement people can make decisions about renegotiating contracts, buying early or waiting to buy to reduce costs.”

—TIM REY,  
COMPETENCY DIRECTOR  
FOR ADVANCED  
ANALYTICS, THE DOW  
CHEMICAL COMPANY

changed by everything from energy-hungry devices such as plug-in electrical vehicles (PEVs) to unconventional energy sources such as solar and wind, so being able to forecast peak load is increasingly critical. “We need to help our customers at the household level to use their energy much more wisely,” says Jeroen Scheer, manager, taskforce energy transition IT at Alliander.<sup>5</sup>

Alliander has 22,000 sensors, spread across 400 substations, in its network that send measurement data at five-minute intervals. This translates into some 3.15 billion records generated every year.<sup>6</sup> The utility uses in-memory computing to analyze huge amounts of data quickly. This enables Alliander to enjoy a host of benefits that fortify its operational integrity, including fast access to measurement data for analysis, automation of once-manual tasks and auditability for regulatory compliance. “We can optimize our grid and create new business models we couldn’t think of a year ago,” Scheer says.

### Making Supply Chains More Efficient

This data-driven attitude now sweeping the industry has the potential to address many long-standing energy problems. Lora Cecere, founder and CEO of research firm Supply Chain Insights, ticks off some of the areas energy companies need to focus on—reducing inventories, increasing revenues and managing growing complexities. All this, she says, requires improved demand forecasting to find alternative sourcing and to better connect the extended supply chain for improved collaboration.

A recent Bloomberg Businessweek Research Services survey focused on the use of analytics and big data found that 48 percent of global manufacturers already use supply chain analytics, with almost two-thirds planning to have it by 2014 (see Figure 3, “Strong Supply Chain Tool Outlook”).

A strong endorsement for use of analytics in the supply chain is Dow Chemical. One of the company’s earliest successes was the development of freight and logistics cost models that analyze about \$2.8 billion in annual truck, rail, ship and air freight costs worldwide. The technology today helps Dow analyze some \$4 billion in annual raw materials spending. “If we know what our costs are going to be, our procurement people can make decisions about renegotiating contracts, buying early

### FIGURE 3 Strong Supply Chain Tool Outlook

To what extent is supply chain analytics already deployed in your organization and will be deployed in 2014?

#### Investment in 2012



#### Investment in 2014



Base: Survey of approximately 300 executives of midsize and large organizations worldwide

Source: Bloomberg Businessweek Research Services 2012 Analytics Study

or waiting to buy to reduce costs,” says Tim Rey, the company’s competency director for advanced analytics.

### Conclusion

The energy industry has long been a data leader. Consider Continental Resources, one of the top 10 oil producers in the United States. In early 2012, the Oklahoma City-based firm required hours to consolidate operational metrics from multiple sources to generate even a single key performance indicator. As a result, the reports were produced only once a month, which meant the latest information was not always available. By using operational analytics, Continental shifted from manual to automated processes and accelerated its ability to glean insights from this data. Production growth jumped 58 percent last year.<sup>8</sup>

Continental Resources “is having explosive growth, so we need to be able to analyze data more quickly,” says Nik Pottola, the company’s CIO. “Using in-memory computing, we’ve demonstrated that reports which used to take 10 to 12 hours to produce can now be done in 15 to 30 minutes. In the past, people would get frustrated and make compromises on the level of data detail they would use to make decisions.”

As data stores grow in tandem with customer demands, the ability to rapidly analyze big data will be paramount to the energy sector’s ongoing growth and success. •

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This research project was funded by a grant from SAP.

5. SAP. “Alliander and SAP HANA.” Customer Testimonial Video. <http://goo.gl/KJiRcA>

6. Tekurkar, Shailesh. “Leveraging the ‘Smart Grid’ for Smart Decisions on Network Asset Replacements.” SAP, November 13, 2012. <http://goo.gl/jje660>

7. IDC Energy Insights. “IDC Energy Insights Survey Reveals 50% of Building Owners Use Smart Building Technologies.” Press Release, April 1, 2013. <http://goo.gl/j43DwC>

8. SAP. “Improve Asset Performance with Operational Analytics.” June 4, 2013. <http://goo.gl/PmrvtP>

# Big Data Analytics Delivers Real-Time Insights for Energy, Process Industries

New research, qualitative interviews and the report from Bloomberg Businessweek Research Services clearly show that energy and process industries struggle to leverage big data and analytics today to improve profitability, mitigate risk and increase expectations for returns on investments in these technologies.

Many companies face inflexible legacy systems, lack of enterprise-wide analytic tools and large volumes of a wide variety of data (structured, semi-structured and unstructured). This creates what is known as the big data problem. SAP's energy and process industry team discusses how technology innovations and real-time insights can help energy and process industry companies overcome these challenges and drive business results—including better ways to reach customers, better asset maintenance and better risk mitigation.

## How do technology innovations solve the challenges faced by most energy and process companies today?

A fast analytical platform that can handle large amounts of transactional and process data quickly and effectively in real time is the foundation solution. The in-memory computing platform called SAP HANA® is built to store and analyze big data from multiple systems. It helps companies achieve a more comprehensive—and instant—view of their assets, customers and business performance. The solution from SAP consists of the SAP BusinessObjects Business Intelligence platform, agile data visualization by SAP Lumira and the ability to leverage sophisticated models and algorithms to predict customer behavior with SAP Predictive Analysis.

## What can energy and process companies do to derive real-time insights?

To start with, a company needs to assess its current status. For example, are you able to maximize return on capital invested? Are you able to keep up with dynamic markets, customer needs and regulations?

Are you able to manage your assets efficiently? Are you able to deliver the right insight to your internal stakeholders to support decision-making and customer service? Second, define your vision for the future. For example, how will your customer needs change? How will your company's offerings need to change? How will you deliver products and services to your future customers? Finally, consider taking a gradual approach to your transformation.

The most immediate value SAP HANA and analytics can provide utility companies— independent systems operators (ISOs) that must handle large quantities of data every day—is to keep the power markets functioning, detect fraud and theft, and identify unbilled accounts. Energy and process companies are also starting to realize savings by using analytics to prioritize capital investments in equipment and to integrate sales and operations planning that support real-time what-if simulations and social collaboration. In addition, by analyzing data from smart meters, utilities can gain a better understanding of customers' consumption behavior.

Select a line of business or a region as a test bed and implement an integrated, real-time reporting and analytics solution. Using SAP HANA, energy and process companies will quickly discover how the sheer speed and flexibility of the platform provide immediate value to business users. Then adopt an enterprise-wide analytics strategy that includes big data. The SAP BusinessObjects Business Intelligence suite will support that strategy. It is a simple, one-stop solution that supports big data, real-time insights, agile visualization and predictive analytics.

For more information please visit this Web site: [www.sap.com/appliedanalytics/](http://www.sap.com/appliedanalytics/)

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## SAP's Recipe for Success

- ▶ **SAP HANA platform handles your big data challenges and delivers real-time insights**
- ▶ **SAP BusinessObjects Business Intelligence suite enables every individual in the organization to make fact-based decisions via easily accessible and relevant information whenever and wherever needed**
- ▶ **SAP Lumira is an agile data visualization solution that helps decision-makers easily discover unique insights**
- ▶ **SAP Predictive Analysis empowers business users with predictive and advanced analytics**
- ▶ **SAP Solutions for Social Media is for analyzing social data and improving business customer experience**
- ▶ **SAP Services help you differentiate your company and make more profitable business decisions**