Moving Forward in Unconventional Oil and Gas
The new supporting role of logistics

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State of the market

The recent boom in North America energy production, specifically in unconventional oil and gas, has generated a great deal of interest and excitement. Unconventional oil and gas production refers to the extraction of hydrocarbons from sources such as oil sands, coal bed methane, shale/tight oil and gas, and pre-salt geological formations. Among these sources the greatest growth is coming from shale deposits where large amounts of oil, also referred to as tight oil, and gas are being produced.

Prominent shale fields in the United States include the Bakken, Barnett, Eagle Ford, Marcellus and Utica formations. Oil and gas (O&G) companies have invested heavily in these areas and the increase in production levels has been staggering. The shale boom initially generated large increases in gas production, but it is also having a dramatic effect on US oil output. The United States is the fastest-growing oil-producing country in the world. According to the International Energy Agency (IEA), the United States is projected to surpass Saudi Arabia as the world’s largest oil producer by 2020 and a net exporter by 2030.1

Rising costs with growth

With this growth significant investment is required. The IEA says that almost 30 percent of the global $15 trillion in upstream oil and gas investment needed through 2035 will be in the United States.2 Figure 1 provides an illustration of 2012 shale production expenditures by oilfield services companies:

Despite the tremendous growth, the cost of shale production remains high and its economic viability is tightly linked to global energy pricing. Unconventional drilling and completion costs can range between five to ten million dollars per well and many more wells are required compared to conventional production. These higher production costs have a big impact on O&G companies’ return on investment.

To date, this new access to unconventional oil and gas deposits is bolstering top-line revenue growth. However, profits are strongly linked to an O&G operator’s ability to execute. Efficient cost management, agility and standardized processes are essential elements needed to improve speed to first production and well profitability. Many of these activities are dependent on efficient logistics, especially transportation of material in and out of well sites, which is the focus of this paper.

Figure 1. Oilfield services expenditures in top US shales—2012.3
At Accenture, we understand the cost pressures O&G operators face resulting from this transition to unconventional production. The unconventional process has many unique characteristics that present new operational challenges. This new environment has created an opportunity for high-performance operators to develop improved production efficiencies and promote their competitive advantage. We believe logistics is a strong focus area as part of an efficient production management strategy.

Logistics, broadly defined as the management of material and people flows throughout an organization, can help:

- Manage costs in the face of rapid growth.
- Sharpen agility to respond to market changes.
- Standardize capabilities to take advantage of efficiencies.
- Improve speed to first production and well profitability.

This paper will explore the need for a new operating model to effectively manage cost and other challenges from unconventional production. Additionally, we will define specific internal and supplier capabilities that O&G companies will need to efficiently support the growing volume of activity driven by unconventional oil and gas production.
Operating challenges

The foremost logistics operating challenge in unconventional production is the movement, storage and management of significant quantities of bulk material. In particular, large volumes of water (fresh, flowback and produced) and proppants (commercial-grade silica) are required during the fracturing process. On top of these requirements, O&G logistics teams must address a growing number of day-to-day operating and market challenges including:

Water management
A typical shale gas well will require up to five million gallons of water to drill and fracture. Water consumption should be sustainable based on local supplies. Well operators, and their suppliers, should be able to manage the transport of large volumes of water in and out of the well site. At the same time increasingly stringent reporting and compliance requirements (federal, state and local regulations) necessitate efficient information capture and management.

Congestion
During the fracturing process, delivery and removal of bulk products and other materials can generate up to 200 trucks per day resulting in high congestion and wait times at the well site.

Lack of infrastructure
Fracturing sites are typically found in remote locations, with immature transport infrastructure, lack of local available service providers and shortages of logistics skills.

Market volatility
As a snapshot of volatility, consider that wellhead prices of natural gas dropped from $10.79 per thousand cubic feet in 2008 to a low of $1.89 in 2012—an 82 percent decline. Flexible and dynamic logistics capabilities are required to support changes in business strategy.

Cost management
Direct and indirect logistics costs can represent as much as 30 percent of total fracturing cost. Other industries generally run in the 10 percent range of logistic benchmarks.

Low profile of logistics within the organization
There has been a lack of emphasis in developing internal capabilities, and little experience in managing logistics.
New operating model

Given the challenges in fluctuating market pricing for O&G commodities, there has been a heightened emphasis by O&G operators on the cost management part of the equation. One way cost is measured is the amount of time required between first spud to production and ultimately delivery of product to the market. There are ongoing efforts to develop and implement operational efficiencies that can reduce this timeline and increase net value generated by the asset.

Based on Accenture's extensive experience working in the oil and gas production environment and applying industry-leading practices in the unconventional space—we recommend that O&G operators move toward development of a “factory” or “manufacturing” model approach. This concept is characterized by higher standardization in all well life cycle activities, including logistics. The adoption of limited well designs, complemented by an enterprise logistics approach, can provide greater efficiencies in the sourcing, planning and execution of logistics services.

A standardized logistics operating model approach can incorporate the following concepts:

**Improve collaboration across business units**

Working in concert, the drilling and completion, operations, and supply chain business units should promote a single plan that manages required material lead times. Improved communication and collaboration can greatly improve the material planning process. This approach can reduce inventory levels and promote having the right material at the right place at the right time.

**Provide a stable flow of material**

Supply chain strategies should include the use of standardized products that promote a stable flow of material. Leading O&G companies are developing bills of materials (BOMs)—listing all of the parts and components needed to manufacture a product, which is a process similar to the manufacturing industry. The benefits of this process include improved procurement cost, improved availability of product and higher reliability.

**Increase use of technology**

The adoption of leading logistics technology is a critical element in seeking to achieve desired cost efficiencies. The use of planning tools can provide greater support to decision making needed to determine material demand and lead times. Transportation management systems (TMS) are necessary to manage enterprise networks and provide efficient planning and execution capabilities. And as previously noted, network modeling tools can identify short- and long-term transportation and inventory strategies. All these tools can provide improved visibility to material, cost, service performance and regulatory reporting.

**New talent required**

O&G operators seeking to transition to this new operating model will need to develop strategies to acquire the required capabilities. For those selecting a path to develop internally, it will require the hiring of logistics professionals, implementation of new systems (e.g., transportation management systems) and the implementation of enterprise processes.

If an external path is selected, it will require the selection of the appropriate allies that have the capabilities and cultural fit to efficiently integrate into the client’s organization. Either path will require organizational leadership support and a change management plan to transition from current decentralized execution to an enterprise management approach.

**Transition to cross-basin play programs**

At present, many producers manage the logistics activities on a well-by-well basis with little centralized planning. The entire field should be managed as an integrated operation for the life of the program. Logistics can support this strategy through the use of network modeling tools and processes that improve the efficiency of material flows. For example, the implementation of an enterprise cross-basin transportation management approach can improve carrier utilization and reduce congestion. Another opportunity area is the development of water management strategies that address the full cycle of water sourcing and disposal.
Logistic supplier capabilities

The final element of this new operating model is the development of supplier strategies to support efficient and safe execution at a competitive cost. The growth of unconventional energy production and related operating challenges has strained the capacity of experienced and skilled suppliers. As O&G operators continue to expand unconventional production volumes, additional capacity and utilization of capable suppliers will be required.

Not surprisingly, this surge in unconventional production, and subsequent O&G investment, has attracted the attention of the logistics industry. A new wave of logistics and transportation providers is now evolving that had minimal or no involvement in this space only a few years ago. These new entrants include global and regional third-party logistics companies (3PLs), large transportation providers such as rail, flatbed and bulk carriers, in addition to new or existing niche providers seeking to capitalize on this new frontier.

The unconventional production life cycle requires specialized equipment and service types to support drilling, completion and ongoing well operations. Flexible and specialized logistics capabilities are needed to support the following activities:

- Rig moves
- Bulk transportation (water, proppants)
- Material transportation (pipe, heavy equipment, maintenance, repair, operations (MRO))
- Hot shots/expedited transportation
- Transportation of produced oil
- Transportation management services (shipment planning, execution, freight bill pay)

Recent developments in the rail and 3PL markets highlight the growth of supplier capabilities supporting unconventional oil and gas production:

**Rail**

Rail has traditionally been used for inbound shipment of material to production sites and for spot shipments of crude and NGLs (natural gas liquids) to market. The rapid increase in unconventional production in areas like the Bakken, Niobrara and Eagle Ford have resulted in insufficient pipeline capacity to handle the volumes of outbound product. Rail is now being used as an alternative to support the flow of outbound volumes. O&G companies are developing “unit train” strategies that allow them to ship a string of rail cars providing greater control and speed of product movement through the rail network.

This option may develop into a longer-term play for the railroads even as additional pipeline capacity is developed. Although rail is more costly than pipeline, it provides greater flexibility. Rail transport provides producers the capability to route shipments to refineries that are paying more for crude or have greater refining capacity. This could help rail to maintain a significant share of the outbound transport of produced products.

As part of the new operating model, O&G companies need to adopt a defined rail strategy. Key elements include the establishment of network rail contracts that provide service flexibility to multiple markets as cost and capacity conditions change. Additionally, developing asset management programs to support the acquisition, management and utilization of rail cars can have major impact in controlling cost.

**Third-party logistics**

Third-party logistics service offerings continue to evolve and can now support many components of a client’s supply chain. These services include functions such as planning, inventory management and manufacturing. 3PLs historically had limited penetration in the O&G market but have noted the growth in the unconventional business and are developing services to address these requirements. The growing complexity and cost management pressures faced by O&G operators present a good entry point for 3PLs.

Several major North American 3PLs have created O&G industry verticals and are developing footprints in this industry. Initial services have primarily been focused on select transportation needs within a segment of an O&G company’s exploration and production network. Representative capabilities being provided include day-to-day transportation planning/execution, carrier sourcing, contract management, and freight bill audit and payment. Additionally, distribution and inventory management services are being outsourced to material suppliers or 3PL providers. Fourth-party logistics (4PL) models are also being explored that involve the management of multiple regions or additional planning and inventory management responsibilities.

As O&G companies move to a new operating model, there will be a need to assess which services to outsource or keep in house. If a decision is made to outsource there are important steps in determining the right fit 3PL, development of well-aligned and risk-based contracts, and ongoing governance structures to effectively manage the relationship.
Benefits of improved logistics

With a new manufacturing operating model in place, O&G operators hold the potential to experience the following benefits:

**Improved visibility**
Have more visibility into transit and receipt of inventory, supplier cost/service performance and regulatory compliance. This capability can be supported through use of logistics technology including transport management systems, mobile scanners and tracking systems.

**Improved safety and efficiency**
Ramp up health, safety, security and environment (HSSE) standards at well sites through cross-basin management that enhances route optimization, lowers site congestion and improves compliance to environmental regulations.

**Improved asset utilization**
Through use of advanced planning horizons and network operational views, logistics providers can improve how they use assets.

**Reduced costs**
Cost reduction can be achieved through strategic sourcing initiatives that aggregate services and volumes.

**Improved stability of supplier availability**
Strengthen relationships by adopting a collaborative approach that allows suppliers to be more efficient.

**Reduced levels of inventory**
Through greater standardization, reduce inventory levels and lead times of material; move toward improved strategies such as tote to bulk and direct delivery to well site.
High performance in unconventional production is contingent on the ability of O&G operators to cost-effectively produce O&G products. More than ever before, logistics will play a key role in the execution of these strategies.

The attainment of needed logistics capabilities is a complex journey that takes time, commitment and financial investment. Major decisions are required to determine the correct approach in acquiring and managing these capabilities. The past practices of using “muscle” to execute logistics activities will no longer provide a cost-effective alternative or keep an operator competitive.

Market leaders, however, will be those that continue to invest in expanding their logistics capabilities. The inclusion of logistics in an overall unconventional business strategy can generate major benefits in the management of unconventional assets.
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References

1 © OECD/IEA, World Energy Outlook 2012, used by permission.
2 Ibid.
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