



New Beginning for US Oil & Gas Sector and the Role of Global Sourcing

November 2013

As one of the most capital-intensive industries in the world, the oil and gas sector requires continuous investments to maintain and grow reserves in the face of accelerating depletion rates from the world's known oil fields. Oil and gas companies that fail to renew their resources on a continuous basis suffer from a diminishing market value and possible obsolescence if their reserves run dry.

When oil prices reached a record high of almost \$150 per barrel in July 2008, industry stakeholders recognized that prices would ultimately pare down. Very few, however, predicted the severity of the fall in early 2009, where prices dropped to about \$40 per barrel. Upstream companies that had committed themselves to Capital investments found themselves saddled with unsustainable production costs. While retrenchment and cost containment are seemingly prudent responses to weaker economic conditions, such a reaction in this industry can result in long-term pain since they cannot afford to be sidetracked by short-term trends. They need to take a long-term view while deploying cost-cutting and process-improvement initiatives and more importantly identify viable options to grow their business by exploring new reserves and next generation technology .The North American Shale gas revolution has not only transformed the US natural gas reserves but is gearing to emancipate the economy from the clutches of global meltdown. In this paper, we outline how United States is at the cusp of being an exporter of natural gas in near future by addressing the imminent need of skills development and knowledge management through global sourcing of services.

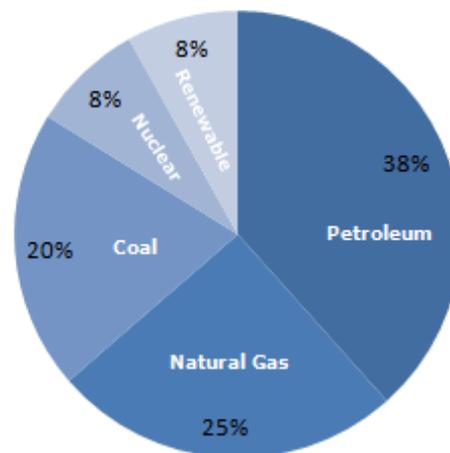
Oil & Gas Production- a new paradigm

Economic recovery in the US from the 2008 recession is proving to be a slow and tortuous one. The global energy sector has been facing major challenges due to the economic slowdown. The credit crisis has affected the energy industry in the form of crude oil demand decline, price fluctuation, and delays in major energy investments, thus directly impacting global oil consumption patterns. The recessionary period has seen US manufacturing employment decline steadily from approximately 17 million in 2000 to under 12 million in 2010. Globalization, leading to job exodus towards lower wage countries, along with a large trade deficit has been prime contributors towards the national unemployment rate of 7.8 per cent. Renowned economists like Peter Morici have observed that reducing trade deficit through domestic energy development can significantly increase GDP while creating thousands of jobs. The World Economic Forum in its energy vision update 2012 states that on an average for every direct job created in the oil industry three or more indirect and induced jobs are also created across the economy. More specifically for each billion cubic feet of incremental gas production approximately 13,000 upstream (drilling, well completion, support industries) and midstream (gathering, gas processing, and pipeline) jobs are generated. An effective national oil and natural gas production strategy has a strong multiplier effect. It helps in setting a strong framework for increased investment, improved application of new technology, growth in exports of goods and services, boosts balance of trade & payments and most importantly adds vital jobs to the flagging economy. Effective management of the Oil & Gas sector can fundamentally revive the US growth trajectory by curbing deficit and promoting the domestic industry.

Energy Independence

More than 60% of US domestic energy needs is made through Oil & Gas industry. Most debates about energy independence to boost economic growth tend to revolve around US economy's reliance on imports for demand fulfillment. The crude oil imports stood at approximately 10.6 million barrels per day in 2012, accounting for 40 percent of the USA's domestic consumption. The extent of US reliance on imported

US Energy Consumption by Source



Data Source: US Energy Information Administration

Fig1: US Energy Consumption by Source

oil has been a matter of great concern over the last forty years. OPEC accounts for approximately 75% of proven conventional oil reserves and 40% of current world oil production. The OPEC resource base is sufficient to support higher production levels but they have an incentive to restrict production to support higher prices and sustain revenues in the long term. US energy independence and economic fallouts are subject to the vagaries imposed by OPEC countries and their production and pricing decisions.

U.S. dependence on imported liquids declines

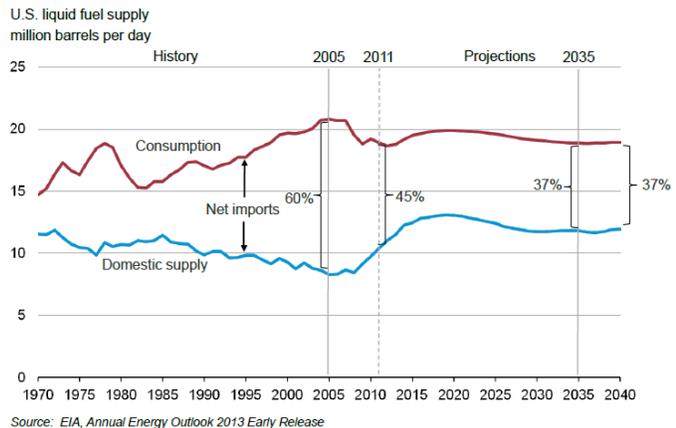


Fig2: Decline in US Dependence on Imported Oil

US crude oil production was steadily declining from 1970 to 2008. However, since 2005, after the development of Barnett Shale gas field, natural gas from shale has been the fastest growing contributor to the total primary energy in the US. The advent of new technology and federal subsidies for development, demonstration, and deployment has released a deluge of natural gas and oil resulting in a long-standing reversal of decline in domestic US crude oil and gas production. It marked a distinct step away from production of oil and gas from vertical drilling to extract from reservoirs filled with hydrocarbons to using horizontal drilling for recovery from the source rock itself.

Shale Gas Revolution in US

The growing dependence on oil imports had prompted US federal government to invest in advance upstream technology for exploration and discovery to access vast resources of hitherto untapped gas. Shale gas, which is natural gas, trapped within shale formations is one of a number of unconventional sources of natural gas, others include coal bed methane, tight sandstones, and methane hydrates. These unconventional gas deposits are distributed across large parts of the US. Coal bed

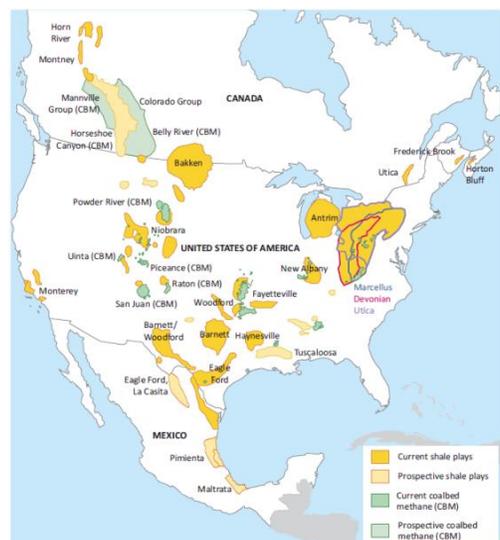


Fig3: North America Shale Gas Plays

Methane is found in the Rocky Mountain States of Wyoming, Utah, New Mexico, Colorado, and Montana. The Marcellus, which extends for tens of millions of acres underneath much of Pennsylvania and parts of New York, Ohio, West Virginia, Maryland and Kentucky along with the Haynesville shale gas formations together make up the largest known gas field in the world. The Texas Permian basin is estimated to have reserves of 70 Billion Barrels, which is larger than the reserves of Kuwait and Saudi Arabia. This basin includes fields such as Wolfcamp Shale (the largest producing shale play in the US based on its cumulative reserves) and Spraberry Shale (third largest shale producer with an estimated reserve of 10 billion barrels). The Bakken and Three Forks formation stretching across Montana and North Dakota have an estimated 7.4 billion barrels of recoverable oil while The Barnett has a cumulative 44 trillion cubic feet (TCF) of recoverable reserves. The Bakken Shale in North Dakota and the Eagle Ford Shale in South Texas are estimated to contribute about two-thirds of US tight oil production, according to the EIA's short-term energy outlook report.

In terms of economic impact, the shale revolution has accrued an estimated 61 Billion USD in economic benefits across 20 Texas counties and in North Dakota over the last 4 years.

The “shale revolution” has led to an astounding growth in oil and gas production. Shale gas production had surged to 66 billion cubic feet per day by 2012 and the price of natural gas has plummeted to around \$15 per barrel of oil. It is helping US becoming self-sufficient in oil and gas and by 2020, US is expected to become a net exporter, after meeting its domestic demand.

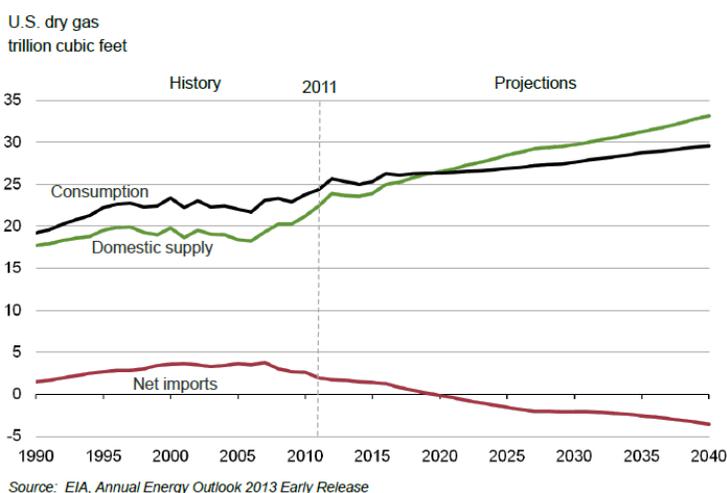


Fig4: Self Sufficiency in Natural Gas Production by US in 2020

According to a IHS Global study

- Shale gas at present contributes to 34% of US natural gas production; it is expected to reach 43% in 2015.
- In 2010, the shale gas industry supported more than 600,000 jobs; by 2015 the total will likely grow to nearly 870,000 and to more than 1.6 million by 2035
- Nearly \$1.9 trillion in cumulative capital investments are expected to be made between 2010 and 2035 in the sector.

- Annual capital expenditures, especially strong in the early years, will grow to \$48.1 billion in 2015
- The shale gas contribution to the U.S. gross domestic product (GDP) was more than \$76.9 billion in 2010; in 2015 it is expected to be \$118.2 billion
- Over the next 25 years, the shale gas industry is expected to generate more than \$933 billion in tax revenues for local, state and the federal governments
- Savings from lower gas prices, as well as the associated lower prices for other consumer purchases, equate to an annual average addition of \$926 in disposable

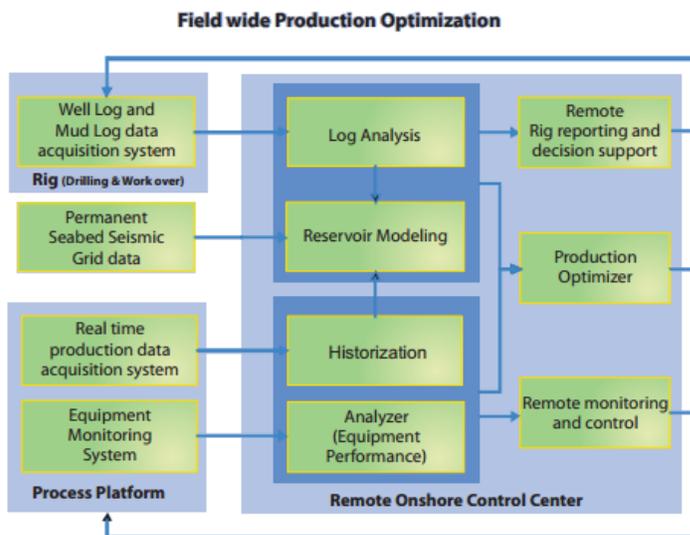


Fig5: Shale Gas Production Optimization

income per household between 2012 and 2015

This “shale gale” or abundant cheap source of natural gas has proved to be a blessing for manufacturers like Dow Chemical, which has saved close to \$2.5 billion in annual energy and feedstock costs. A vast number of industries making products like tires, carpets, anti-freeze, lubricants, cloth, and

plastics, which involves generous use of natural gas, are shifting back towards the US. Natural Gas Liquids (NGLs) production from shale gas has found application in a wide range of industries including petrochemical plants, space heating, motor fuels, and gasoline blending. Shale gas is being viewed as the largest change in US energy system since nuclear became part of the electricity grid 50 years ago. From 2000 to 2012, there has been a significant shift in electricity supplied to grid being generated from natural gas than being dependent on coal. The other fallout benefit of shift towards the fuel-efficient natural gas is the potential to make a meaningful impact on the environment by saving about 400 million metric tons of carbon emissions annually and significantly contribute to reduction in global warming.

ICT in Exploration & Production (E&P) and role of global sourcing of services

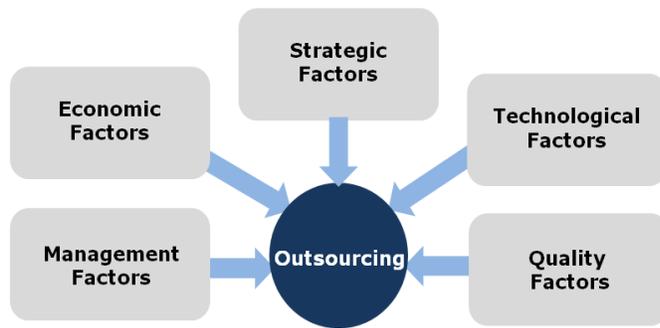


Fig6: Sourcing Drivers for Exploration and Production

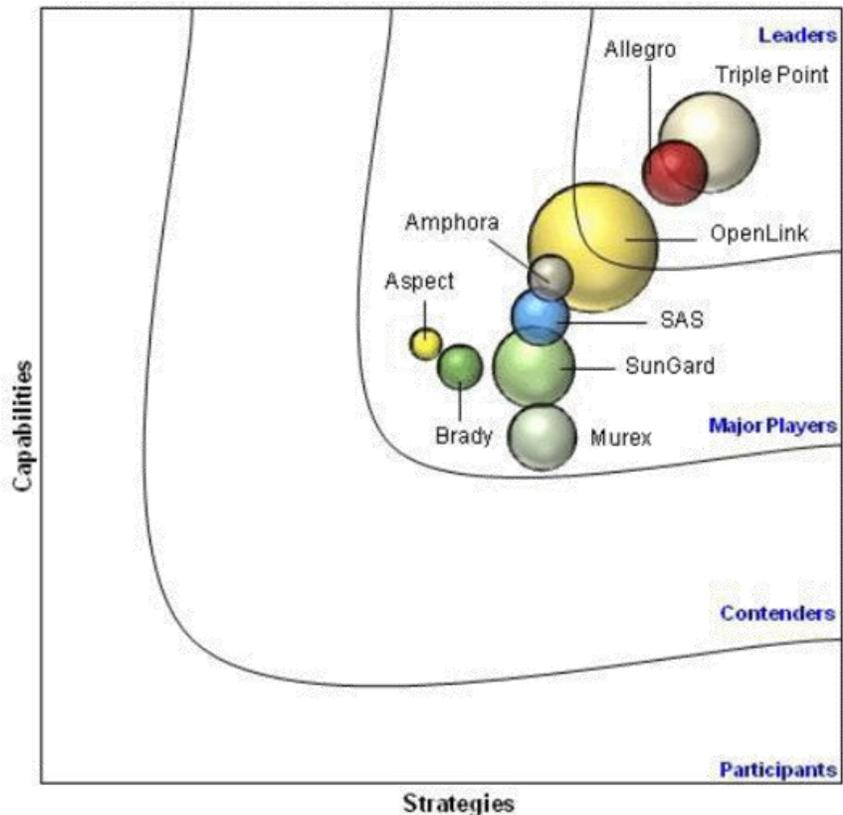
Ever-growing energy demands necessitate quick decisions on E&P. Real-time data availability becomes critical for shifting analysis and decision-making responsibilities out of the E&P site to a centralized offsite location. Upstream E&P organizations are facing the challenge of graying work force, shortage of expert manpower from external service provider, stringent safety regulation and environmental protection along with the conventional business challenges like aggressive production targets and greater cost pressure. To date the Oil & Gas Industry has not had the same pressures other industries have had to reduce manpower costs via outsourcing. Critical manpower shortages combined with more domestic competition, especially in the area of shale gas will be the drivers for the Digital Oilfield 2.0 which can be translated into Outsourcing 2.0 and will include critical “insourcing” strategies.” Said Joe Summa, Chairman of the Summa Group of companies. These organizations are adopting new technologies and new operating models to shape their future. Such “Digital Oil Fields Solutions” enable total remote control with minimum on-site presence and centralize the information where greater computing and analyzing resources are available. Solutions based on GIS, seismic and drilling data analysis, environmental analysis, real time systems, and EAI standards to help oil and gas companies integrate their E&P data for remote decision-making processes, are common. The critical areas of skilled manpower shortage in the oil and gas sector are mainly in onshore roles including design engineering, project management geosciences and other skilled technicians.

The National Academy of Sciences instituted a committee to furnish remedial action to counter this workforce shortage in the energy sector. The recommendations suggested business-education-government partnership to enhance STEM education to meet industry needs in the long term. To get over the short-term demand for resources there has been significant lobbying with government to facilitate recruitment of skilled personnel from outside of the country. The oil and gas industry has had a pent-up demand for talent for quite some time and with increasing focus on energy self-reliance the hunt for talent has reached critical proportions. An aging workforce, need for better knowledge management and leveraging technology for driving operational efficiencies are critical on the management’s agenda. Upstream and midstream

business are expected to be the most affected, as large numbers of experienced workers retire and competition for new talent heats up. Knowledge, not assets, will be the source of future value growth in the sector, and a shortage of well-qualified professionals will constrain the abilities to both scale and compete effectively. In the short term, to plug the demand supply gap for skilled workforce, US will need to resort to global sourcing of knowledge-based services in the sector.

Decision to globally source knowledge services is an outcome of various strategic, economic, technological, and other factors. Major Technology & Professional Services companies have established technology and engineering centers in countries such as India and are also supporting petroleum engineering education in China. In an intensely cost driven sector it makes tremendous business sense to leverage services from other parts of the world where it is far more economical to procure required services. The dependence on service companies to provide technical services is proving to be very profitable for the oil & gas companies. Significant cost reduction by moving to a variable cost model for back-office services, renewed business focus on their key vertical by freeing resources and a flexible workforce to address fluctuating needs provide

tremendous value addition. Most large services firm as per IDC's marketscape have a significant play in the sector. According to the Worldwide Oil and Gas IT Spending Guide, the global market for IT services to the oil & gas industry totaled \$14.5 billion and is expected to grow to \$18.4 billion by 2015.



Source: IDC Energy Insights, 2013

Fig7: IDC MarketScape Energy Trading and Risk Management Vendors

The table here below is illustrative of services being sourced by global oil and gas majors :

<p>Accenture</p>	<p>Accenture provides services in the all the three stages of oil & gas production which includes Upstream, Midstream and Downstream. Their suite of services addresses operational, strategic, and external challenges of oil & gas operators. Midstream services include business capability planning, gas business strategy, gas business capability development, and operational consulting. The downstream services manage refining, wholesale, and retail marketing, lubricant operations, plants & assets and the hydrocarbon supply chain. Accenture helps and provides services to both international and national oil companies globally.</p>
<p>IBM</p>	<p>IBM's portfolio of technology solutions help optimize power generation performance, workforce, and asset management, and improve customer operations. Using IBM's predictive analytics and data models energy suppliers are able to optimize power flows and predict production anomalies.</p>
<p>PWC</p>	<p>PWC provides insights and understanding of the oil and gas industry and keeps a close watch on industry trends and issues which help to resolve customer specific issues. The suite of services includes capital projects and infrastructure, commodity and energy trading, financial advisory services, governance risk and compliance, systems and IT, leadership & people and operational effectiveness.</p>
<p>Deloitte</p>	<p>Deloitte provides solutions and perspectives specific to the oil and gas industry. The firm offers integrated solutions to meet oil & gas client's needs in particular oil and gas information and transaction support using propriety consulting and risk management consulting. It serves all the top 10 oil & gas companies in Fortune 1000.</p>
<p>TCS</p>	<p>TCS has a host of ERP package implementations and enterprise asset management for the upstream, downstream and midstream sectors. Their portfolio also includes health-safety-environment solutions, plant automation and design and performance management solutions. Operating through delivery centers located in Houston, Calgary and Edmonton TCS's energy vertical serves international energy companies like BP across their value chain.</p>
<p>HCL</p>	<p>HCL Tech does regulatory reporting, risk analysis, front & back office integration, document management, and remote infrastructure management for Fortune 50</p>

	oil and gas majors.
CSC	BP's Coryton refinery in the UK uses CSC's solution of wireless technology and mesh networking to allow maintenance and operator workers at plants to have real-time connectivity to applications where they previously had only voice radio coverage. This results in a huge amount of cost savings as laying cables in an oil refinery is a very expensive proposition. BP also deploys a RFID equipped ID badge to monitor workers in refineries, engineering and production facilities. This Location Aware Safety System (LASS) enables security personnel to monitor workers' location in real time from their desktop.
Infosys	Infosys Pipeline Integrity Management is a comprehensive product that helps pipeline operators transcend from preventive to predictive maintenance while controlling costs and conforming to regulations. It also has mature risk analysis processes to conduct root cause analysis and take timely corrective action.

It is quite evident that service firms from both developed and emerging economies are starting to get actively involved in core business functions and are beginning to counter the challenges posed by the dearth of locally available skilled employees in the oil and gas industry.

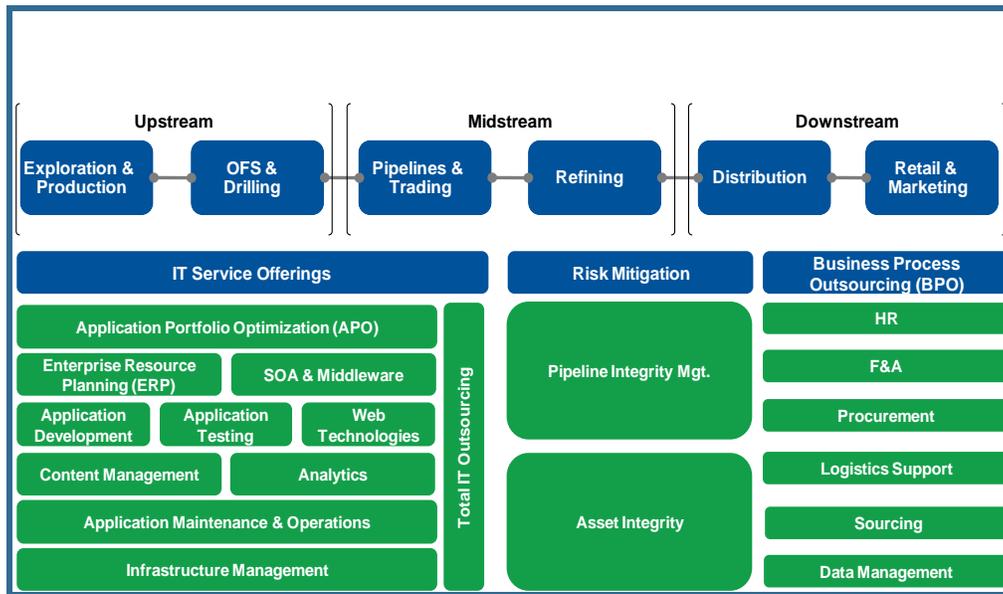
Conclusion

The crux of future energy independence lies in the country's ability to tap their massive unconventional oil resources. Shale gas has fundamentally altered the US energy supply in an otherwise moribund economy. It is precisely here that the current government's proactive steps has given it a head start and led to an excess of cheap natural gas flooding the markets resulting in prices being 50 to 70 percent cheaper than Europe and Asia. The ripple effect is visible in lower cost of electricity for industries that are energy intensive and reduced cost of feedstock for domestic manufacturing, steel and chemical industries. The next two decades would most probably see US turning into a net oil exporter. Due to new drilling techniques there is an estimated 2,200 trillion cubic feet of recoverable natural gas in the US with the nation's consumption standing at one percent of it. The average American household stands to save \$1000 annually because of cheaper natural gas used for heating, cooking, and electricity generation. This boom in oil production in Texas and North Dakota has led to unemployment rates of 3 per cent, much lower than the national average. The rapid expansion of shale gas production in the US has created hundreds of thousands of new jobs. In addition, the lower

natural gas prices that have resulted from this expanding shale gas production have lowered businesses and consumers' energy bills, not only for natural gas, but also for electricity, an increasing percentage of which is generated from natural gas. The growth in gas production might soon prove to be an economic game changer as companies are fast reconsidering energy-intensive manufacturing in the US with natural gas as a fuel. The US dependence on expensive import of crude oil has undeniably reduced over the past few years primarily due to rising shale oil & gas production. The future does hold a distinct promise of freedom from foreign oil restrictions, disruptions of energy supplies and most importantly reliance on domestic manufacturing to cater to the nation's needs. Oil and gas majors are aware of this transformational opportunity and are trying to ensure that lack of skilled knowledge workers do not derail the party. The determination of those within the energy sector remains evident in the ambitious recruitment targets that have been put in place to help companies implement their strategies.

The crush of potential projects, the breakneck pace of drilling and greater manpower needs will necessitate significant investments in developing partnerships with global technology and professional services firms to plug the demand-supply gap for knowledge-based services in securing the future for unbridled growth.

Avasant Services for Oil & Gas Sector



Companies in the oil & gas sector are significant drivers of economic growth, especially in emerging nations. However, these enterprises are also capital and technology intensive and the consequences of mismanagement can be severe both economically and environmentally.

Oil and gas companies continue to operate in a challenging, low-growth global environment today. Avasant offers support with critical initiatives to address technology investment, talent shortages, as well as cost and profitability pressures within the industry.

Avasant offers clients the requisite operational experience to drive comprehensive solutions from the top to the bottom of the value chain.

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