

Skills Shortages in a Booming Market: The Big Oil and Gas Challenge

FMI Corporation Locations

Raleigh - Headquarters

5171 Glenwood Avenue
Suite 200
Raleigh, NC 27612
Tel: 919.787.8400
Fax: 919.785.9320

Denver

210 University Boulevard
Suite 800
Denver, CO 80206
Tel: 303.377.4740
Fax: 303.398.7291

Scottsdale

14500 N. Northsight Boulevard
Suite 313
Scottsdale, AZ 85260
Tel: 602.381.8108
Fax: 602.381.8228

Tampa

308 South Boulevard
Tampa, FL 33606
Tel: 813.636.1364
Fax: 813.636.9601

www.fminet.com

The strains on labor capacity in oil and gas construction markets worldwide are becoming increasingly well known. These strains continue to affect projected project costs, and several large capital projects have already been delayed or cancelled (see Shell's Louisiana GTL plant as an example) as a result of rising costs and questionable long-term profitability projections. As demand continues to increase in the face of the LNG export gold rush, construction firms are faced with unprecedented pressures to retain and grow talent.

To keep up with this extremely dynamic and competitive – if not unprecedented – business environment, U.S. energy infrastructure construction firms need to develop a robust talent pipeline to tackle the industry's many business challenges in the coming years. In 2008 just 3.8 percent of the total construction workforce was engaged in direct oil and gas construction. By 2012, 6.4 percent – nearly double 2008's number – of that workforce was engaged in direct oil and gas construction. According to FMI's estimates, by 2017 nearly 10 percent of the total U.S. construction workforce will have moved over to this burgeoning segment of the industry.

Fierce competition for talent in this sector is already driving construction companies to think about their human capital needs and the strategies required to optimize their access to – and retention of – qualified and experienced workers. Questions that are starting to move up company executives' strategic agendas include, "How do we prevent knowledge loss with a large percentage of experienced workers preparing for retirement?" and "How do we anticipate and prepare for the workforce depletion and adapt to a shifting employee culture?"

Scott Duncan, vice president with FMI Capital Advisors, states, "The oil and gas construction market remains vibrant, and many firms are seeking new ways to expand and grow their market presence. As competition for limited resources intensifies, labor and talent management are quickly becoming a key differentiator in company performance and overall company value. Companies seeking to build a presence in this market need to ensure they have the systems and processes in place to maximize productivity and retain top talent."

This article provides oil and gas construction demand and labor supply forecasts, presents key labor dynamics in today's U.S. oil and gas construction industry, and summarizes recommendations on how to prepare for the imminent labor and knowledge void. Information was collected through 25 in-depth interviews with executives of energy infrastructure construction firms as well as with select FMI industry experts.

The article also presents three case studies, including ARB, Inc.; Kiewit; and Henkels & McCoy, and describes how these companies are dealing with long-term talent management and resource planning issues.

The refinement of hydraulic fracturing technology has allowed the United States to go from an increasingly dependent buyer of foreign oil to the second-leading producer of oil in the world.

Overview of the U.S. Oil and Gas Construction Boom

In 2008 approximately 60 percent of the crude oil produced in the United States came from one of three places: the Gulf of Mexico, Texas or Alaska. Domestic production was on the decline, having decreased about 2 percent annually on average since 1970. Imports from foreign nations filled the gap, bringing with them significant political and economic implications for the country.

In the five years following, the refinement of hydraulic fracturing technology has allowed the United States to go from an increasingly dependent buyer of foreign oil to the second-leading producer of oil in the world. The technology has also given energy companies the ability to exploit huge natural gas reserves across the country. While traditionally much of the country's oil and gas infrastructure lies along the Gulf Coast, shale development is now taking place across the country in states like Pennsylvania, West Virginia, Ohio, Oklahoma, Colorado and North Dakota, increasing oil and gas production at previously unfathomable rates. Located deep beneath Pennsylvania and West Virginia, the Marcellus Shale has increased natural gas production by six times in just four years. If the Marcellus were its own country, it would be the 8th-largest gas producer in the world. Ten years ago this was unimaginable.

Figure 1. Lower 48 States Shale Plays

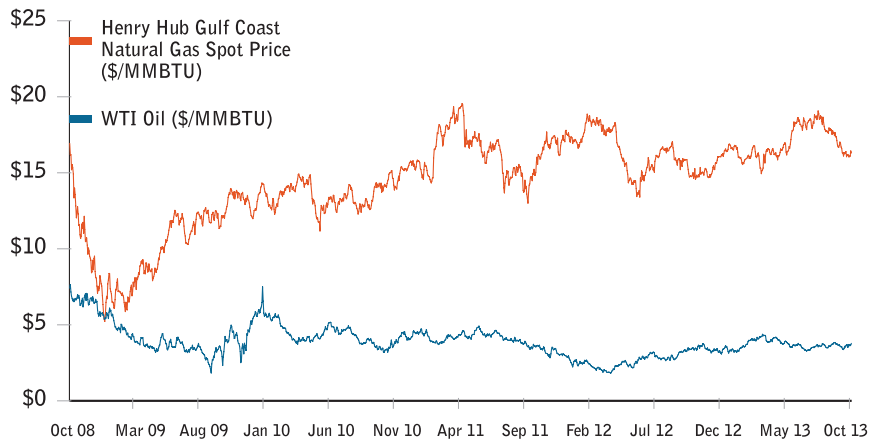


Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

This dramatic production increase has affected prices. The rush to produce natural gas from formations like the Marcellus began to have a significant effect in 2012, when the price of natural gas fell to an all-time low of \$1.82 per MMBTU on April 20, effectively making it one of the cheapest energy resources in the world. Oil prices also began to exhibit some very peculiar behavior: In early 2011, oil produced in the United States began to trade at a substantial

discount to oil produced overseas. With so much oil production in far-off places of the country, surpluses were developing at storage and transportation hubs unable to get to market. As a result, prices declined and refiners rejoiced.

Figure 2. The Cost of Energy — Oil versus Natural Gas



Source: Energy Information Administration

In just five years, the United States has witnessed an energy revolution. Production of oil and gas is increasing, prices are falling, and entrepreneurs nationwide are finding newer and better ways to take advantage of this dynamic. The biggest challenge for all of them comes down to one issue: infrastructure.

Due to infrastructure constraints, domestically produced oil has traded at a discount, and natural gas prices have declined precipitously. There is tremendous profit incentive for companies that can liquefy natural gas and transport it overseas, and for companies that can transport oil from overstocked hubs in the Bakken shale and other oil-rich areas.

FMI estimates that capital expenditures on oil and gas construction projects in the United States will exceed \$55 billion in 2013, up 11 percent from 2012. We estimate this growth will continue at an average of 17 percent through 2017 as the construction of refineries, petrochemical facilities, pipelines, liquefied natural gas facilities and related infrastructure projects heats up. What is not included in these figures is the effect that cheaper energy prices will have on industrial spending nationwide. Already, utilities across the country are switching from coal-powered electricity generation to gas, and other energy-intensive industries are examining whether natural gas is a more affordable commodity. All of this will require new investment and new construction.

In all, FMI estimates more than \$330 billion will be spent on oil- and gas-related construction during the next four years, nearly double the amount that has been spent in the past four years. As oil and gas producers increase drilling efficiencies and place greater pressure on prices (particularly in natural gas markets), we expect this figure to increase as the United States begins to return to its manufacturing and industrial roots.

The Looming Gap: Oil & Gas Construction Demand and Labor Supply

Full Throttle Ahead

The oil and gas sector has experienced an era of intense and accelerated growth over the last few years. Even as many other industries have fallen prey to the economic recession and other negative impacts, this particular industry has remained strong and steadfast; that is not expected to change anytime soon. Through 2017, in fact, the rate of growth in oil and gas is projected to be more than twice that of the construction industry as a whole (Table 1).

The fact that many construction employees have gravitated to the growing oil and gas sector should come as no surprise. In 2008 just 3.8 percent of the total construction workforce was engaged in direct oil and gas construction. By 2012, 6.4 percent – nearly double 2008's number – of that workforce was engaged in direct oil and gas construction. According to FMI's estimates, by 2017 nearly 10 percent of the total U.S. construction workforce will have moved over to this burgeoning segment of the industry (Table 2).

Table 1. U.S. Construction Volume Put in Place and Construction Spending in the U.S. Oil and Gas Industry

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013e | 2014e | 2015e | 2016e | 2017e | Total % Change |
|--------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|----------------|
| Residential Buildings | 357,746 | 253,930 | 249,113 | 252,658 | 286,523 | 338,163 | 379,599 | 420,452 | 465,383 | 505,941 | 41% |
| Nonresidential Buildings | 499,702 | 432,196 | 346,488 | 336,438 | 354,202 | 352,509 | 369,070 | 392,102 | 418,454 | 446,789 | -11% |
| Non-Building Structures | 210,118 | 217,078 | 208,959 | 198,918 | 216,228 | 218,971 | 228,435 | 238,879 | 252,080 | 267,411 | 27% |
| Total | 1,067,566 | 903,204 | 804,560 | 788,014 | 856,953 | 909,643 | 977,104 | 1,051,433 | 1,135,917 | 1,220,141 | 14% |
| % Change from prior year | na | -15% | -11% | -2% | 9% | 6% | 7% | 8% | 8% | 7% | |

Construction Spending in the Oil & Gas Industry Estimated for the United States

Millions of Current Dollars

September 2013

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013e | 2014e | 2015e | 2016e | 2017e | Total % Change |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|----------------|
| | 35,878 | 38,314 | 40,536 | 43,855 | 48,897 | 55,008 | 63,680 | 75,264 | 89,181 | 102,784 | 186% |
| % Change from prior year | na | 7% | 6% | 8% | 11% | 12% | 16% | 18% | 18% | 15% | |

Source: FMI Projections

According to FMI's definition, the oil and gas industry comprises the following projects:

- New buildings and structures related to extraction, processing/refining. Storage, transmission and distribution of oil and gas products.
- Similar buildings and structures within the chemical industry, which are wholly dedicated to petroleum-based chemicals.
- Additions, alterations, conversions, expansions, reconstruction, renovations, rehabilitations and major replacements.

- Site preparation and outside construction of fixed structures or facilities such as petroleum and gas pipelines, sidewalks, on-site streets, parking lots, utility connections and similar facilities that are built into or fixed to the land.
- Fixed, largely site-fabricated equipment not housed in a building, primarily for petroleum refineries and chemical plants, but also including storage tanks, refrigeration systems, etc.

The following are excluded from FMI's definition of the oil and gas industry:

- Maintenance and repairs to existing structures or service facilities.
- Cost and installation of production machinery and equipment items not specifically covered above, such as heavy industrial machinery.
- Drilling of gas and oil wells, including construction of offshore drilling platforms.
- Land acquisition.
- Ancillary construction that supports the oil and gas industry, including rail, ports, streets and highways, commercial buildings and housing.

Table 2. Total Construction Employment Demand — All Segments

Estimated for the United States
 Thousands of Full-Time Workers
 September 2013

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013e | 2014e | 2015e | 2016e | 2017e |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Carpet, Floor and Tile Installers and Finishers | 79.4 | 68.0 | 62.1 | 538.7 | 61.3 | 60.6 | 63.6 | 66.9 | 70.2 | 74.6 |
| Sheet Metal Workers | 107.9 | 95.3 | 87.8 | 77.6 | 87.5 | 85.7 | 92.1 | 104.5 | 113.6 | 127.7 |
| Brickmasons, Blockmasons and stonemasons | 110.5 | 91.3 | 86.3 | 75.2 | 84.5 | 85.9 | 89.8 | 102.1 | 114.7 | 121.3 |
| Roofers | 113.5 | 105.6 | 93.1 | 82.2 | 94.1 | 99.5 | 107.2 | 119.3 | 130.3 | 142.4 |
| General and Operations Managers | 121.2 | 107.4 | 98.6 | 84.7 | 96.5 | 110.8 | 119.8 | 133.3 | 145.2 | 153.1 |
| Cost Estimators | 128.0 | 111.0 | 102.8 | 91.1 | 101.1 | 107.1 | 114.2 | 126.6 | 137.4 | 154.6 |
| Drywall Installers, Tapers, Ceiling Tile Installers | 151.3 | 124.9 | 109.3 | 96.8 | 109.4 | 114.4 | 122.6 | 134.4 | 147.3 | 162.1 |
| Construction Managers | 176.9 | 154.0 | 142.2 | 122.9 | 139.8 | 150.7 | 161.9 | 183.2 | 195.9 | 215.0 |
| Cement Masons, Concrete Finishers and Terrazzo Workers | 184.7 | 155.7 | 140.3 | 122.3 | 138.6 | 152.0 | 166.6 | 182.8 | 199.2 | 219.2 |
| Painters and Paperhangers | 197.6 | 168.3 | 155.5 | 135.6 | 153.4 | 157.5 | 172.3 | 187.0 | 204.4 | 217.3 |
| Engineering & Design Occupations | 265.7 | 235.6 | 216.7 | 189.0 | 209.8 | 219.3 | 232.8 | 252.5 | 272.2 | 292.5 |
| Construction Equipment Operators | 297.5 | 257.4 | 238.0 | 209.3 | 239.3 | 241.6 | 253.4 | 272.1 | 291.6 | 315.4 |
| Helpers, Construction Trades | 349.2 | 303.3 | 275.1 | 240.4 | 272.1 | 274.5 | 287.4 | 304.8 | 326.3 | 361.4 |
| Pipelayers, Plumbers, Pipefitters and Steamfitters | 398.0 | 358.3 | 324.2 | 286.5 | 331.1 | 330.8 | 353.3 | 374.2 | 399.9 | 425.9 |
| First-Line Supervisors/Managers | 442.1 | 392.8 | 359.8 | 309.0 | 349.5 | 349.5 | 370.1 | 398.6 | 423.4 | 445.7 |
| Electricians | 484.0 | 427.0 | 394.8 | 342.7 | 394.4 | 394.3 | 408.0 | 434.5 | 461.4 | 493.5 |
| Carpenters | 721.0 | 598.6 | 525.8 | 459.5 | 524.8 | 530.0 | 565.3 | 593.7 | 616.1 | 647.2 |
| Construction Laborers | 771.0 | 663.3 | 594.7 | 520.5 | 581.6 | 577.4 | 603.6 | 628.2 | 657.9 | 694.1 |
| Total | 5,099.5 | 4,418.0 | 4,007.0 | 3,983.7 | 3,968.9 | 4,041.6 | 4,283.8 | 4,598.7 | 4,907.0 | 5,263.0 |
| % Change from Prior Year | | -13% | -9% | -1% | 0% | 2% | 6% | 7% | 7% | 7% |

Source: FMI Projections

Growth, of course, is good. However, this particular expansion could come at the expense of other construction sectors that are now experiencing their own recoveries and the growth associated with such revival. It could also affect the oil and gas industry itself. The growth in the sector's share of total workers, for instance, is taking place despite concurrent double-digit growth in the U.S. residential sector. This fact alone could put constraints on the rebirth of residential construction across the nation as contractors scramble to fill positions.

Across the 17 craft categories that FMI tracks, the total number of workers required across all categories within the oil and gas industry was 254,600 in 2012 (Table 3). By 2017 this demand will have approximately doubled, leaving more than 247,000 skilled positions unfilled. As any top construction firm understands, mitigating shortages through additional hours and workers often leads to limitations and can take a toll on safety, quality and productivity. And while required skill sets are readily transferable in some cases (i.e., roofers, masons, painters and operators), the oil and gas industry will find itself competing with other construction sectors for available talent while also trying to develop new talent.

The Value of Construction Put in Place. This is a measure of the value of construction as it is installed or erected at the site during a given period. For an individual project, this includes:

- Cost of materials installed or erected.
- Cost of labor (both by contractors and force account) and a proportionate share of the cost of construction equipment rental.
- Contractor's profit.
- Cost of architectural and engineering work.
- Miscellaneous overhead and office costs chargeable to the project on the owner's books.
- Interest and taxes paid during construction (except for state and locally owned projects).

Table 3. Total Construction Employment Demand — Oil and Gas Segment

Estimated for the United States
 Thousands of Full-Time Workers
 September 2013

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013e | 2014e | 2015e | 2016e | 2017e |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Carpet, Floor and Tile Installers and Finishers | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.8 | 0.9 | 1.1 | 1.2 | 1.4 |
| Sheet Metal Workers | 4.4 | 4.6 | 4.8 | 5.2 | 5.7 | 6.4 | 7.3 | 8.5 | 9.9 | 11.3 |
| Brickmasons, Blockmasons and stonemasons | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.8 | 2.1 | 2.4 | 2.8 | 3.2 |
| Roofers | 26.7 | 28.3 | 29.7 | 31.8 | 35.1 | 39.0 | 44.6 | 52.1 | 60.5 | 69.2 |
| General and Operations Managers | 4.9 | 5.2 | 5.5 | 5.9 | 6.5 | 7.2 | 8.2 | 9.6 | 11.2 | 12.8 |
| Cost Estimators | 4.9 | 5.2 | 5.5 | 5.9 | 6.5 | 7.2 | 8.3 | 9.6 | 11.2 | 12.8 |
| Drywall Installers, Tapers, Ceiling Tile Installers | 1.1 | 1.2 | 1.2 | 1.3 | 1.5 | 1.6 | 1.9 | 2.2 | 2.5 | 2.9 |
| Construction Managers | 6.8 | 7.2 | 7.5 | 8.1 | 8.9 | 9.9 | 11.3 | 13.2 | 15.3 | 17.5 |
| Cement Masons, Concrete Finishers and Terrazzo Workers | 6.2 | 6.6 | 6.9 | 7.4 | 8.2 | 9.1 | 10.4 | 12.1 | 14.1 | 16.1 |
| Painters and Paperhangers | 4.8 | 5.0 | 5.3 | 5.7 | 6.3 | 6.9 | 7.9 | 9.3 | 10.8 | 12.3 |
| Engineering & Design Occupations | 13.7 | 14.5 | 15.2 | 16.3 | 18.0 | 20.0 | 22.9 | 26.8 | 31.1 | 35.6 |
| Construction Equipment Operators | 10.6 | 11.2 | 11.7 | 12.6 | 13.9 | 15.4 | 17.7 | 20.6 | 23.9 | 27.4 |
| Helpers, Construction Trades | 11.7 | 12.4 | 13.0 | 14.0 | 15.4 | 17.1 | 19.6 | 22.9 | 26.5 | 30.4 |
| Pipelayers, Plumbers, Pipefitters and Steamfitters | 28.2 | 29.9 | 31.3 | 33.6 | 37.1 | 41.2 | 47.1 | 55.0 | 63.8 | 73.1 |
| First-Line Supervisors/Managers | 14.9 | 15.7 | 16.5 | 17.7 | 19.5 | 21.7 | 24.8 | 29.0 | 33.6 | 38.5 |
| Electricians | 15.4 | 16.3 | 17.1 | 18.3 | 20.2 | 22.5 | 25.7 | 30.0 | 34.8 | 39.8 |
| Carpenters | 15.0 | 15.8 | 16.6 | 17.8 | 19.7 | 21.8 | 25.0 | 29.2 | 33.9 | 38.8 |
| Construction Laborers | 22.7 | 24.0 | 25.2 | 27.0 | 29.8 | 33.1 | 37.9 | 44.2 | 51.3 | 58.8 |
| Total | 193.8 | 205.1 | 215.0 | 230.5 | 254.6 | 282.8 | 323.6 | 377.6 | 438.3 | 501.8 |
| % Change from Prior Year | | 6% | 5% | 7% | 10% | 11% | 14% | 17% | 16% | 14% |

Estimated Composition of Engineering and Design Demand

| | | | | | | | | | | |
|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Petroleum Engineers | 8.9 | 9.5 | 9.9 | 10.6 | 11.7 | 13.0 | 14.9 | 17.4 | 20.2 | 23.2 |
| Other Engineering and Design | 4.8 | 5.1 | 5.3 | 5.7 | 6.3 | 7.0 | 8.0 | 9.3 | 10.8 | 12.4 |
| Total | 13.7 | 14.5 | 15.2 | 16.3 | 18.0 | 20.0 | 22.9 | 26.8 | 31.1 | 35.6 |

Estimated Composition of Pipelayers, Plumbers, Pipefitters and Steamfitters

| | | | | | | | | | | |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Pipefitters | 16.4 | 17.4 | 18.2 | 19.6 | 21.6 | 24.0 | 27.5 | 32.1 | 37.2 | 42.6 |
| Welders | 10.7 | 11.3 | 11.8 | 12.7 | 14.0 | 15.6 | 17.8 | 20.8 | 24.1 | 27.6 |
| Other | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 1.6 | 1.8 | 2.1 | 2.5 | 2.8 |
| Total | 28.2 | 29.9 | 31.3 | 33.6 | 37.1 | 41.2 | 47.1 | 55.0 | 63.8 | 73.1 |

Source: FMI Projections

In other instances, the severity of labor shortages is compounded by required skill sets that are more specific to the oil and gas industry. Petroleum engineers, pipefitters, welders, controls electricians, supervisors and managers, for example, will all be in high demand during the next four years, according to FMI's research. One executive of a large global EPC company confirms, "Just like electricity is sold on the spot market when there's an emergency or a hurricane, the price of labor is going to go sky-high. It's a basic supply-demand model. The open-shop-certified welders right now have pushed the rate to \$35 per hour and \$70 per diem. That's the going rate on the Gulf Coast, up from about \$28 per hour a year or two ago." During the five-year period 2012 to 2017, key shortages will include:

| | |
|----------------------|--------|
| Petroleum Engineers: | 11,500 |
| Pipefitters: | 21,100 |
| Welders: | 13,600 |
| Supervisors: | 19,000 |

In each case, the demand for these workers will approach twice the current supply. This will require employers to sharpen their focus both in terms of recruiting, training and retaining new talent as well as developing a long-term comprehensive human resource strategy. Without these and other initiatives in place, firms will risk missing this period of impressive growth and expansion within the industry. The rewards are sure to be substantial for those companies that focus on growing and nurturing their talent pools, and challenging, at best, for those firms that take a more languid approach to their human capital.

The Changing Face of Today's Oil and Gas Industry

Preparing for the Next Big Labor Squeeze

Industry experts and company leaders alike have been talking about the looming construction labor shortages for years now. The Great Recession has exacerbated this concern due to the thousands of workers that have left the construction industry. Today, the depleted skills and knowledge pool has left contractors across the nation and abroad scrambling for skilled workers to build quality work on time and on budget.

Stephen E. Sandherr, CEO of the Associated General Contractors (AGC) of America, says, "With many former construction workers now employed in other industries, a number of firms are likely to have an increasingly hard time finding enough skilled workers if employment continues to expand."

The U.S. oil and gas construction industry, which did not track the typical slowdown of other construction sectors, is bracing itself for unprecedented labor shortages, particularly in the U.S. Gulf Coast region. An executive at a large international EPCM firm states, "If all the build-out projects driven by the natural gas supply become a reality, then there's going to be a major shortfall of qualified, skilled trades on the Gulf Coast, both for union and open-shop contractors."

These near-term skill shortages will likely peak in 2014 and 2015, when oil and gas construction projects around the Gulf Coast are expected to come online, specifically in the Lake Charles, La., area. Several industry experts pointed out that there were distinct similarities between the work and labor dynamics in today's Lake Charles area and the oil sands region of Fort McMurray, Alberta, Canada, in the mid-2000s. Dan Lumma of Kiewit's Energy Group says, "There is a natural ceiling to the amount of craft, resources, infrastructure, engineering, equipment, etc., that you can apply in one location at one time. It's a self-regulating phenomenon, and clients naturally adjust their schedules to react to those circumstances."

Although craft labor shortages are a regional phenomenon, they can still create a ripple effect across the globe in today's flat and shrinking world. As one labor relations manager for a large global industrial contractor says, "There is a huge skilled international workforce from India and the Philippines that has filled the industry's jobs in the Middle East and Africa for the past decade. Today, this workforce is being lured to countries like Australia, Chile and Canada where they can increase its salary tenfold. This is starting to have an impact on international companies' ability to staff their work in lower-paying regions of the world."

“I’ve never known a project that didn’t get built because construction firms couldn’t find enough labor. Now it may take longer and it may cost more, but we’re a pretty innovative nation and we always find a way to get things done.”

– Executive of a large international EPCM firm

Time to Rethink Old Business Paradigms

Based on these widespread global implications, the need for long-term resource planning and comprehensive risk assessment is becoming ever more important. Construction firms that operate in a direct-perform general contractor role as part of a larger EPC team, for example, have the opportunity to plan for future labor needs well in advance. Kiewit is a good example of a company that places qualified individuals in its clients’ and engineering partners’ offices. Lumma states, “This is a fairly new strategy that’s working out well for the company, particularly with progressive clients who have a long-term vision and strategy.”

Several participants in this study pointed out the need for better industrywide coordination in terms of long-term resource planning and project development. As one executive at a large international EPCM firm states, “Company A is doing one thing. Company B is doing something else. In addition, company C is working on five other things. Everyone is stuck in their own corner with their hands over their eyes so that nobody can see or read anything. What’s really needed is more transparency and an open dialogue among both contractors and owners industrywide.”

Eddie Clayton, contracting strategies manager for the Southern Company Generation, confirms this sentiment, “Companies need to work together to solve these long-term resource problems. If owners are going to leave it solely up to the contractors, then they’re going to be sadly mistaken. Owners should develop a craft labor strategy that includes their engagement in workforce development activities. Not only will appropriate involvement help to mitigate project staffing risks but it will also benefit the communities and regions that they serve.”

Changing Labor Dynamics

With the current oil and gas boom ramping up in the United States, many projects are underway, and many more will be kicking off over the coming months. “If all those projects happen, the peak workforce would have to multiply five to six times about what it is right now. The fact is, that’s not going to happen,” states Lumma. “We’re heading into a very, very significant demographic issue.”¹

Under these unprecedented levels of labor pressure, industry participants must acknowledge that, in these transformational times, not all of the previous forms of labor models and business approaches will continue to be appropriate. The changing competitive landscape, combined with emerging technologies and ideas about how to ramp up and organize companies, has become a real force influencing the oil and gas industry. As such, we will likely see more union labor re-entering high-growth markets such as the Gulf Coast area, with owners scrambling to get projects off the ground. As one industry executive points out, “There’s a reluctance on the part of the owners to bring back the unions into the market (in the Gulf Coast area), but that needs to be transcended with the pragmatic reality that you cannot get these facilities built all open-shop or all union. It’s going to take a combination of the two.”

In addition, numerous U.S. construction companies are looking to bring on foreign workers to fill some of the labor void. However, the topic of immigration in the U.S. remains highly

¹ Energy Industry Faced with Possible Workforce Shortage. The Energy Collective. Sarah Battaglia. March 23, 2013.

complicated and controversial, and is unlikely going to solve the immediate labor requirements for the oil and gas industry.

Success Stories: Preparing for the Next Big Boom

ARB, Inc.: Stepping Up to the Plate

For Greg Dahl of ARB, Inc., the current labor shortage is less about not being able to find individuals to fill specific job roles and more about not being able to locate ample skilled labor who are properly trained and qualified to do the work at hand. To ward off any challenges that could be coming down the labor pike, Dahl, vice president, says ARB consistently cross-trains its employees, thus creating a “fully diversified” workforce that can handle myriad tasks and responsibilities.

“As a company, we do all types of pipeline work, not only oil and gas, but also pipeline rehabilitation and water work. You name it, we do it,” says Dahl. “In order to hold on to a competent workforce to handle all of that, we’re always cross-training. That allows us to identify future needs and, ideally, have the employees working on other projects until the need arises.” The fact that the U.S. workforce is aging – and that millions of baby boomers are heading into retirement – also challenges companies like ARB, which is bringing in younger workers to offset the exodus. That younger blood creates an entirely new set of challenges, according to Dahl. “Most of them would rather be in front of computers,” says Dahl, “and doing less physical work.”

Developing Stability and Continuity

A union shop, ARB is signatory to contracts with the building trades and the United Association, which includes welders, plumbers and pipefitters. As such, the company has partners when it comes to finding skilled labor. Ultimately though, ARB is responsible for the quality and competency of its workforce. The challenges are many: seeking out individuals who have the potential to succeed, contribute and grow; outlining the opportunities that will exist for those who are prepared; and providing ongoing training in all aspects of pipeline construction, jobsite management, behavior-based safety initiatives, awareness of environmental best practices, and importantly, offering feedback on performance, naming just a few of them.

Like most companies in the oil and gas sector, ARB wants to develop and maintain a stable workforce. To make that happen, ARB will in some cases pay higher than union scale, depending on skill and experience levels. “I’ve never had a case where a union objected to us paying its people more than the scale wage,” says Dahl.

The company also provides incentives to employees who “show initiative and leadership qualities,” says Dahl. “We feel like we offer the best environment, opportunities and compensation to retain the people and the workforce that we need. That commitment has served us well.” As a result, ARB’s workforce has been trained and shaped over years and understands how to be highly productive, safe and make money on jobs. “Some of our people, I’ve worked with for more than 20 years. They’re more productive compared to workforces of other companies that tend to go through cycles of hiring and firing,” explains Dahl.

New Regulations, New Training Requirements

Looking ahead, Dahl expects the cost of getting a new employee up, running and productive to increase due to new operator qualification requirements, certifications and safety standards. “The level of training, knowledge and awareness expected of an individual who worked on pipelines 10-20 years ago wouldn’t be acceptable today,” Dahl points out. “There’s just so much more that you have to know and such extensive training to undergo.”

Safety, for example, was not understood as a key component of productivity. Today it is an integral part of everything companies like ARB do. In fact, Dahl says there are direct correlations between productivity, safety and lower costs. “Everything these days is integrated as a comprehensive approach to performing the work,” says Dahl, “so it costs a lot more to put a competent worker out in the field.”

The industry’s commitment to safety and increased regulation is not going away and neither is the anticipated labor shortage. These two trends will continue to put pressure on companies like ARB to build long-term, reliable workforces that stay in place as long as possible and that get the job done in a timely, productive and safe manner. “We’re constantly trying to understand and work through issues regarding regulations, certification requirements, new safety standards, etc., and make sure that everyone is correctly trained,” says Dahl. “We’re working our way through all of that now.”

Kiewit: Getting in on the Ground Floor

Labor constraints are taking their toll on the oil and gas industry, where executives like Dan Lumma of Kiewit’s Energy Group work harder these days to get in on the “ground floor” with client projects. Operating in a direct-perform general contractor role as part of a larger EPC team – as opposed to working in a subcontractor role – Kiewit often gets involved with jobs several years before they even break ground.

“That gives us the opportunity to plan for future labor needs well in advance,” says Lumma, senior vice president. During the months or years leading up to a new project, for example, Kiewit places qualified individuals in its clients’ and engineering partners’ offices. Lumma says this is a fairly new strategy that is working out well for the company, particularly with progressive clients who have a long-term vision and strategy.

For Kiewit, that level of labor planning takes on several forms. The company establishes relationships with the respective entities years before the project even starts, including working with local union halls, and talking to them about our manpower peaks over time,” Lumma explains.

Keeping Workers Safe and Engaged

To help manage the war for skilled craft labor, Kiewit focuses on the long-term, safe, controlled work environment that it can provide. “On good project sites that extend over time,” says Lumma, “we usually don’t have much of a problem with high turnover.”

With approximately 10,000 staff members, Kiewit hires anywhere from 1,200-1,400 new employees annually. Most are graduate engineers and business managers right out of college, says Lumma. Those individuals are trained and developed by the company's senior managers and supervisors, many of whom have been with the company for 15-20 years. "A portion of their job responsibility is to develop new employees, from senior managers all the way down to first-line supervisors," says Lumma, who expects that internal commitment to training will be an important strategy as the labor market heats up even further over the coming years. For craft labor, Kiewit aims to retain highly skilled workers whenever possible. "We try to take them to the next project," says Lumma, "instead of letting them sit on the bench for months at a time in between projects."

Changing the Business Paradigm

Pointing to the Lake Charles, La., region, Lumma says the area looks a lot like the Fort McMurray, Alberta, region did back in the mid-2000s. "Lake Charles is going to be one of the most overheated regions in the near future," says Lumma. When that happens, he says there will be a natural ceiling to the amount of labor, resources, infrastructure and staff that can be mobilized in a single location at any given time. "It's a self-regulating phenomenon that we saw happen at Fort McMurray," says Lumma, "and clients naturally adjusted their schedules to react to those shortages."

Lumma points out that the industry as a whole needs to change the way these types of projects are planned and carried out in the future. "I don't think the industry should approach these new projects in a business-as-usual sort of way, but instead everyone ought to take on a more progressive, long-term view of how to approach these projects in the planning stage, engaging people early on so that they can help overcome these resource challenges," says Lumma.

Henkels & McCoy, Inc.: Bracing for the Next Big Surge

With the national construction market solidly in recovery mode, the leadership team at Henkels & McCoy, Inc. knows it is only a matter of time before finding skilled workers to fill field positions becomes a challenge. Finding experienced construction management superintendents and project managers will not be any easier, predicts John Harrower, vice president and division manager of the pipeline construction division, namely because so many of these individuals exited the industry during the economic recession.

"Individuals who can implement and manage project controls, manage cost controls and forecasting, and handle scheduling are already in short, short supply," says Harrower, who is also seeing a dearth in the number of experienced "front-end" professionals who can deftly assess potential projects and submit bids when applicable. These "basic estimating skill sets" have been hard to come by for several years, according to Harrower, who sees that early, upfront work as an essential component for successful projects.

At this point, Henkels & McCoy is covering its projects across all areas where employees are getting harder to find and recruit. "We have good control over what we already have in-house right now," says Harrower, "but if we had more candidates in each of the three areas (superin-

tendents, project managers and front-end types), we'd be able to undertake a lot more work as the market continues to heat up."

Shifting Positions

One way Henkels & McCoy is offsetting the labor shortage issue is transferring administrative professionals into its estimating group and building up the latter in a way that will allow the company to bid on more projects. On the project management side, the company relies on an in-house job rotation and management training program called Growth Opportunities for Leadership Development (GOLD), which focuses on candidates who already have some level of construction management expertise but want to fast-track their project management development. GOLD participants rotate through assignments in seven different operations platforms over a 21-month period, allowing them to take on larger responsibility upon graduation from GOLD more quickly than those who have not gone through the program.

"Where it used to take 15-20 years to build a senior project manager, we're now able to fast-track them within six to eight years," Harrower explains. The GOLD program incorporates a pipeline division sponsor who also heads up the project management group. Responsible for bringing in new talent, evaluating the candidates every three to four months and then rotating individuals through different assignments on a quarterly basis, the sponsor helps candidates get an "overall perspective of everything that they need to manage, and within a much shorter time frame," says Harrower. He adds, "That way they get an overall perspective of everything they need to manage a lot quicker than they normally would in their career."

As part of this development program, Henkels & McCoy is very strategic about promoting foremen into assistant superintendent roles – in an effort to build more superintendents organically. "That takes some time to cultivate," says Harrower, "but it's a solution that we're using on several of our larger projects right now."

Finally, Harrower says Henkels & McCoy has taken a closer look at the specific skill sets needed within the pipeline division and the role that those skill sets play within the various projects that the company undertakes. This exercise has helped the company build "pools" of employees who can cover specific aspects of a project while also giving individuals more job options. A new employee, for example, can get his/her feet wet doing less complicated work, while a senior project manager would take on a larger role within a bigger project. "That effort is part of an ever-changing commitment to continuous improvement that's underway here at any given moment," says Harrower.

Reputation Counts

Growing organically is one thing, but attracting new blood to the workforce requires a different level of effort. To keep its new employee pipeline growing, Henkels & McCoy leans on its reputation of 90 years as a privately held, large company in its field. "We have an incredible reputation for maintaining people and continuity," says Harrower. "Our average management tenure is very high and our attention to safety is very well-known."

Harrower says Henkels & McCoy's attention to safety and commitment to running a best-in-class organization will help tackle the looming labor crunch. "We're definitely on the right

road, with a focus on project management and project controls on our jobs that wasn't seen in the pipeline sector for many generations," says Harrower. "As clients become more sophisticated and jobs more complicated and expensive, we'll be gearing up to handle the project backlogs that we're seeing and bracing ourselves for an interesting second half of the year."

Top Business Imperatives for Energy Infrastructure Construction Firms

Following is a summary of the top-five business fundamentals pulled from 25 in-depth interviews with executives of energy infrastructure construction firms and select FMI industry experts.

- 1) **Develop comprehensive in-house training programs and build long-term knowledge pipelines.** The recent expansion of the U.S. oil and gas industry coupled with the retirement of many experienced supervisors is causing overstretched construction firms to rethink their training and succession plans. Successful companies are developing comprehensive knowledge transfer programs, shifting knowledge from senior (and soon-to-be-retiring) employees to the next generation and leveraging organizational expertise and best practices across the business.

Fast-track leadership programs are also becoming critical as experienced craft workers move into leadership and mentor roles, training less experienced employees in a very short time frame. As one industry executive explains, "With the limited amount of skilled labor available, we took many of our company's highly skilled craftsmen and turned them into supervisors to help manage less experienced workers. These skilled craftsmen went from being welders one month to foremen the next month, which doesn't necessarily mean they're good-quality supervisors. Leadership and mentoring skills are very different from technical expertise."

In the fast-paced oil and gas industry, a purposeful approach to training and knowledge transfer will not only significantly increase the readiness and skill sets of the employees, but also will attract new talent to the industry with the compelling story of commitment to the individual employee. For energy infrastructure construction firms to succeed, they will have to effectively attract, develop and retain human resources. Developing a long-term strategy to address these human talent issues and following through with diligence and consistency on the execution of that strategy will become the key competitive differentiators among firms in the oil and gas sector.

"With the limited amount of skilled labor available, we took many of our company's highly skilled craftsmen and turned them into supervisors to help manage less experienced workers. These skilled craftsmen went from being welders one month to foremen the next month, which doesn't necessarily mean they're good-quality supervisors. Leadership and mentoring skills are very different from technical expertise."

— Industry Executive

“In construction there’s a lot of emphasis on individual achievement. As a result, rather than rewarding soft skills around leadership or mentoring, we often tend to look at individual performance. It’s definitely an area where the industry as a whole needs to transform in the coming years.”

— CEO of a pipeline construction company

- 2) **Engage your people and provide a healthy, safe work environment.** In an industry that is constantly in flux and characterized by extreme working conditions, company executives must keep their employees engaged and devoted on a daily basis. Industry leaders who have established a good reputation over the years with corporate cultures focused around safety, education and employee well-being find themselves at an advantage in the war for talent. Rena Lo, human resources manager at AMEC Oil and Gas, Inc., states, “If we’re talking about retention, then two things are very important: Employees have to like what they do and also like the people they work with/for.”

Motivation, reward management and performance appraisal largely drive employee retention and satisfaction. Even when offered higher salaries and/or compensation packages, for example, the most engaged and trained employees are less likely to jump ship.

Cory Jodoin, president at Jen-Col Construction, confirms, “It really must be more than just the dollars. Every single person in my company can find a job elsewhere that will pay more than what they earn here at Jen-Col. So you need a culture where people value more than dollars. That’s the challenge: coming up with a plan for retention, training, development and making every job meaningful. Just really creating opportunity, growth and development for people – that is key.”

Another industry executive adds, “A key focus for us is succession, and we try to keep our people engaged at all times. You have to treat people right, and these days many companies don’t seem to invest enough in their people.”

In addition to the methods mentioned above, the oil and gas sector is using techniques like e-learning to retain current employees and recruit new ones. Also playing a key role in both retention and recruitment are fundamentals such as safety culture, working conditions, supervision, co-workers/interpersonal relationships, job security and organizational policies.

- 3) **Integrate HR with other core business functions.** Look at your organizational structure and re-evaluate how all the different departments and business units are performing – both together and separately. Over the last few years, CEOs in the construction industry have started to look for synergies among functional areas, finding ways to leverage support functions, such as HR, IT and finance, to be “fit for a purpose” and ensure that they are more closely aligned with the overall enterprise strategy. Jason Baumgarten, FMI’s Western consulting group manager, explains, “I see a lot of stand-alone systems work counter to each other. It can be very inefficient. For example, if you have a strong HR department and are hiring great people but have no systems in place – such as a strong career path or effective incentive-based compensation program – then you’ll end up being a prime target for your competitors to recruit from.”

In the oil and gas sector, specifically, this could not be more accurate. Human capital has become a hurdle, and overcoming that obstacle requires buy-in from technical, operating and HR leaders. From the board down to the individual operating company level, new attention is being paid to human resource functions whose operational objectives must be linked to the firm’s overall operating targets. Aligning different business functions

in more integrated ways will help increase communication across the organization and push employees to work collaboratively and more effectively toward common strategic goals.

- 4) **Understand your (human) risk.** According to the Bureau of Labor Statistics, the U.S. oil and gas industry lost a record number of workers on the job in 2012 – the same year that industry fatalities increased to 138 from 112 (in 2011). This represents a 23 percent increase and the largest number of oil and gas worker fatalities since the current data series for the BLS Census of Fatal Occupational Injuries (CFOI) began in 2003.

These numbers echo the rapid pace at which the oil and gas industry has been expanding in recent months. As energy infrastructure construction firms scramble for skilled workers to keep up with demand, companies are more apt to hire less experienced workers who lack the necessary safety training or technical skills. An executive of a large EPC firm states, “We’ve seen brokers recruit people who worked as fishermen in the past and say they can weld and now they’re applying for offshore welding jobs. Most of these people don’t have any experience working in safe environments, and it’s a huge risk for a company like ours to hire them on our projects.”

To circumvent this whole frenzy and scramble for last-minute “bodies,” construction firms and end users/owners must rethink their collaboration efforts. Progressive energy infrastructure construction firms are already looking into innovative partnering approaches as witnessed in the case of Kiewit, where the company establishes relationships with the respective entities years before the project even starts, including working with local union halls and talking to them about their labor peaks over time.

In the oil and gas industry, where owners demand rigorous safety standards and thorough risk management practices, construction companies cannot afford to make any mistakes. A competent workforce – particularly skilled supervision – will become ever more crucial in managing risk and productivity on oil and gas construction projects. Mark Breslin, CEO of United Contractors and author, adds, “In five to seven years, I believe a contractor’s ability to grow will hinge on their ability to procure competent field supervision. The boomer retirement curve is going to be painful. It won’t be bonding, capital or the market – but contractors’ ability to provide qualified foremen superintendents who can build work in a risk-averse environment.”

- 5) **Work smarter and increase project management capacity.** Oil and gas projects worldwide are increasing in complexity and scope as more companies discover new frontiers and invest in non-traditional exploration methods. Environmental impact, employee safety and strict adherence to budgets and schedules top the list of stakeholder concerns. Successful energy infrastructure construction companies are investing heavily in building their project management capacity by innovating in areas such as prefabrication, technology, knowledge management, communication, among other things. In the coming years, clients will focus on construction companies that can limit rework orders; optimize labor, equipment and materials scheduling; and use a modular approach to project management. These tactics will help improve productivity and manage costs in a tight labor market – two key concerns for owners in this sector.

“In five to seven years, I believe a contractor’s ability to grow will hinge on their ability to procure competent field supervision. The boomer retirement curve is going to be painful. It won’t be bonding, capital or the market – but contractors’ ability to provide qualified foremen superintendents who can build work in a risk-averse environment.”

— Mark Breslin, CEO of United Contractors and Author

“If construction firms active in the oil and gas sector had invested in hiring and training talent back in 2010-11, they would be significantly more profitable today. Instead, most firms are today confronted with a chronic shortage of engineers, project managers and skilled tradesmen. And odds are that situation will worsen in the years ahead.”

— Michael Mangum,
Senior Consultant with
FMI’s Center for Strategic
Leadership

Brian Johnson, executive vice president at Michels Corporation, states, “Due to the current shortage of skilled welders as a result of the increased volume of pipeline work throughout the country, we are taking a harder look at automated welding systems to offset the needs that our clients are requiring of us. Although this only helps in the larger diameter pipe sizes.”

Don Thorn, president at Welded Construction, adds, “We’re seeing some advancements of processes and equipment through the use of technology. The long, large-diameter pipes will probably be done with mechanized welding in the future, and that will certainly help with the craft shortages to some extent. As a result, we will need people with experience utilizing mechanized welding equipment and increased training activity from our labor forces.”

Planning for Future Labor Needs

The U.S. oil and gas industry is on the brink of its largest human capital shortfall as it faces one of the most significant expansion periods in its history. If companies do not figure out how to transfer knowledge from soon-to-be-retiring employees to younger generations of workers, decades of industry wisdom and expertise will be lost forever over the next five to seven years. Fierce competition for talent in this sector is already driving energy infrastructure construction firms to rethink their human capital needs and optimize access to – and retention of – qualified and experienced workers. Some firms have circumvented the crisis by simply poaching talent from competing firms or leaning even more heavily on their veteran workers. Unfortunately, these are stopgap measures at best.

Successful companies are thinking long term and building new talent pipelines, developing targeted interventions, assessing the business impact of skills shortages and considering the options available to build competency. While there is no silver bullet to solve significant skills shortages (the ongoing nursing shortage is a good example of this), tactical combinations of programs and new paradigms will become the standard as the U.S. oil and gas industry labor shortages exacerbate. Potential implications for the industry might include higher wage-push inflation, potential decreases in international competitiveness and even the erosion of future domestic oil production capacity.

In Canada, for example, FMI consultants have observed a shifting HR strategy to finding/hiring talent regardless of current project demands or needs. Put simply, progressive companies are actively building their benches in anticipation of future projects and are willing to take a P&L hit to avoid labor crunches. As Michael Mangum, senior consultant with FMI’s Center for Strategic Leadership, explains, “If construction firms active in the oil and gas sector had invested in hiring and training talent back in 2010-11, they would be significantly more profitable today. Instead, most firms are today confronted with a chronic shortage of engineers, project managers and skilled tradesmen. And odds are that situation will worsen in the years ahead.”

It is time to tie HR objectives directly to business objectives and build continuous feedback loops that help improve management techniques and ultimately influence strategy. Through these and other efforts, oil and gas infrastructure construction firms will find themselves better positioned to tackle the labor shortages and move beyond to ongoing success. Without these proactive moves, the U.S. oil and gas construction industry will struggle to right itself during a period of unprecedented labor shortages.

For more information please contact: Sabine Huynen Hoover, Senior Research Consultant, at 303.398.7238 or via email at shoover@fminet.com

Scott Duncan, Vice President, at 303.398.7250 or via email at sduncan@fminet.com

W. Christopher Daum, Senior Managing Director, at 919.785.9264 or via email at cdaum@fminet.com

About FMI

FMI is a leading provider of management consulting, investment banking† and research to the engineering and construction industry. We work in all segments of the industry providing clients with value-added business solutions, including:

- Strategic Advisory
- Market Research and Business Development
- Leadership and Talent Development
- Project and Process Improvement
- Mergers, Acquisitions and Financial Consulting†
- Compensation Benchmarking and Consulting
- Risk Management Consulting

Founded by Dr. Emol A. Fails in 1953, FMI has professionals in offices across the U.S. We deliver innovative, customized solutions to contractors, construction materials producers, manufacturers and suppliers of building materials and equipment, owners and developers, engineers and architects, utilities, and construction industry trade associations. FMI is an advisor you can count on to build and maintain a successful business, from your leadership to your site managers.

