

CONSTRUCTION

HOW UNCONVENTIONAL OIL AND GAS IS SUPERCHARGING THE U.S. ECONOMY



Cabot Oil and Gas employees work on a natural gas valve at a hydraulic fracturing site in South Montrose, PA. The Marcellus Shale Gas Feld extends through parts of New York, Pennsylvania, Ohio, and West Virginia and could hold up to 500 trillion cubic feet of natural gas. (Image credit: Getty Images via @daylife)

It's an exciting time to be in the energy industry in America. The impact of unconventional oil and gas development on the U.S. economy is considerable, with potentially hundreds of billions of dollars in investments, millions of new jobs, and a renaissance of American ingenuity and innovation.

In thinking about what is to come, looking back five years helps set the stage. January 2008: The energy sector was facing the great recession, high current and future expected natural gas prices, and job losses to China. There was a generally poor outlook for the energy industry and the economy.

Few could have predicted the changes that were to come. Unforeseen happenings include the North Dakota oil rush, liquefied natural gas facilities being used as export facilities (instead of as import facilities as originally planned), railroads hauling crude oil, and jobs coming back from China. And, this is just the beginning. The commencement of the crude oil and natural gas revolution can be boiled down to one simple equation:

Abundant resources + cost-effective extraction = high production levels of unconventional oil and gas.



The net effect is a reshaping of the U.S. energy industry and our economy. Additionally, the country's increased reliance on natural gas (displacing coal) has already benefited the environment, and will continue to do so in the future. Carbon emissions hit a 20-year low (in the first quarter 2012 according to the U.S. Energy Information Administration) and some industry observers believe that the U.S. could meet the Kyoto agreement standards by 2020 (even though the U.S. did not sign the accord).

The emergence of unconventional oil and gas will have tremendous impacts on both the energy industry and the economy. The outlook for unconventional gas is exceptionally bright — with expectations for relatively low future natural gas prices, enough supply to meet domestic needs, and surplus enough to export to other countries. While the unconventional oil story continues to unfold and evolve, an abundance of domestic crude oil is expected. And, thus, an opportunity to not only significantly reduce the country's dependence on oil imports, but to also increase energy security. Currently, crude oil prices are out of balance as new supply regions are isolated, making it difficult to get crude oil to market. That is expected to change once the necessary infrastructure is built to handle the new-found supply. As a result of these infrastructure needs, and the tremendous opportunities associated with unconventional oil and gas, U.S. economic activity is rising.

Rising levels of economic activity can be divided into three distinct but overlapping waves of capital investment. The first wave of capital investment targets new and expanding oil and gas production areas. Sustained investment in the upstream sector — including wellheads, drilling, and production — will be required to keep pace with increases in demand for the foreseeable future.

The second wave of investment will focus on infrastructure to address new supply locations, delivering the product to market, and capitalizing on the near-term opportunities arising from lower energy costs. Billions of dollars of investments specifically targeting capital projects in this wave are being announced weekly. Substantial investment in crude oil, natural gas, and natural gas liquids pipelines will be required in order to build, expand, and reverse pipelines to address the new supply source locations. Natural gas processing plants that separate natural gas liquids (LNG) from natural gas will be required to address the growing production levels and new supply regions. In addition, LNG facilities will begin to export natural gas, and there is a potential opportunity for natural gas-to-diesel plants.

In addition to these traditional areas of investment, creative market solutions are also emerging, such as rail transportation of crude oil. While railroads may serve primarily as a near- to mid-

term solution in the wake of long-lead time pipeline solutions, they are nimble competitors with small capital requirements that can be quickly deployed to utilize the country's far-reaching rail networks. With only a few years needed to recover capital costs on investment, the competitive landscape changes and rail transportation rates could be reduced after pipelines enter the market to keep railroads competitive and still profitable. These factors suggest that railroads could be in the crude oil transportation business for the long haul.

During this second wave, there will be a manufacturing resurgence, in part because of lower expected energy costs. Other macroeconomic factors will also be at work — including relative improvement in U.S. labor rates as labor markets tighten in China and other countries. Petrochemical plants will become cost-effective competitors in the worldwide market and will be a significant component of the manufacturing investment story. Manufacturing facilities will be built to manufacture pipes, drill bits, valves, and other required infrastructure materials. In addition, other manufacturing plants will likely be built solely as a play on the expectation of relatively low energy costs into the future. Such suspects could include those whose energy costs are a large portion of production costs: semiconductors, plastics, and LCD televisions. The trend includes linking production and energy resources in an efficient manner, and moving production closer to market demand in order to minimize transportation-related costs.

The last wave of investment — which won't begin to heat up for a few years — focuses on the consumers segment. In this wave, additional natural gas-fired power plants will be built to replace retiring coal plants and meet future increases in demand. Of course, new gas-fired power plants will initially be built in regions with less excess capacity (post coal plant retirement). Another impact of U.S. unconventional oil and gas development will be increased electricity demand (occurring more dramatically in various localized pockets), directly resulting from investment in waves one and two. New production areas and locations for processing and manufacturing plants will observe higher load growth. For example, localized areas within the Bakken region expect energy demand to double in the next five years. As a result of very specific changes to the economic activity and corresponding energy consumption levels, a more granular analyses will be required than is previously provided by traditional load forecasting methods.

This third wave will also see a significant number of new heavy-duty natural gas vehicles, including bus and truck fleets. Greater reliance on natural gas-fueled light-duty vehicles is possible, but will require more time due to greater infrastructure requirements and technological innovation. Other creative opportunities being

explored include natural gas pumps (hooked up to the home) to fuel natural gas vehicles, and light duty vehicles relying on fuel cells (which manufacturers hope to begin building by 2015). While it's not currently clear who the winners will be, it's safe to say that positive market forces and ample opportunity will lead to innovative solutions.

The near-term outlook for total capital investment (from primarily first- and second-wave projects) is immense. The table below provides a snapshot analysis of the short-term outlook

(through 2020) for domestic (lower 48 states) based capital investment. These estimates are conservative and based largely on publicly reported company business plans. For example, Table 1 includes only a portion of expected U.S. LNG projects going forward, as compared to the full list of Department of Energy applications. The estimate also excludes the massive \$65 billion proposed Alaska pipeline/export facility project and third wave investments targeting natural gas-fired power plants and natural gas vehicles. Even with just a portion of total investment included, the conservative estimate of short-term investment reaches more than \$300 billion.

ESTIMATE OF U.S. UNCONVENTIONAL OIL AND GAS CAPITAL EXPENDITURES AND JOB CREATION (THROUGH 2020)

CATEGORY	INVESTMENT (BILLIONS)	JOBS CREATED (THOUSANDS)
Exploration and Production	\$60 - \$70	440 - 480
Pipelines	\$50 - \$65	800 - 920
NG Processing Plants	\$35 - \$45	450 - 550
LNG	\$20 - \$30	260 - 370
Manufacturing	\$70 - \$80	920 - 985
Rail and Other Infrastructure	\$10 - \$20	125 - 200
TOTAL	\$245 - \$305	3,000 - 3,505

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These investments have a huge economic impact on the U.S. economy — impacting jobs, economic growth, and energy security. Some studies indicate that the U.S. has avoided retreating into a worse economic recession as a result of activity in the unconventional oil and gas sector. Production areas for unconventional oil and gas have observed very low unemployment and stronger GDP and tax revenues as compared to the rest of the U.S. As a result of the significant near-term investments associated with unconventional oil and gas, it's possible that up to 3.5 million jobs will be created from the infrastructure build out and related opportunities (including both direct and indirect jobs).

What could impede U.S. progress? Political gridlock. Politicians will need to check their partisan baggage at the door and resolve the fiscal cliff issue well before the deadline. If there is no timely resolution, an economic contraction and an uptick in unemployment is possible. Another potential impediment includes possible additional taxes on the oil and gas industry. If the country wants to invest its way out of the sluggish economy, it may want to avoid additional taxing of the oil and gas industry, as it will only serve to impede investment and dampen growth. A wise move would be to enhance growth in key strategic areas, enabling the economy to maximize the benefit. While the federal government should address the fiscal cliff and avoid consideration of additional taxes to the oil and gas sector, state and local governments (particularly those located near unconventional oil and gas regions) should be forward-thinking and incentivize manufacturing and the oil and gas industry to set up shop. Following such a path will likely facilitate economic prosperity more significantly than not.

The bottom line is that the country has a unique opportunity before it. Transformational change, driven by American entrepreneurialism and ingenuity, is underway. Innovative solutions will address complex problems and hundreds of billions of dollars of investments and millions of new jobs are within reach.

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