



WHITE PAPER

Collapsing Oil Prices

Strategies and Opportunities

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Abstract

Different oil price scenarios will have varied implications, strategies, and opportunities for producers, midstream developers, and investors. Recent declines in oil prices have put the brakes on a number of production and midstream investments and have increased the risks for new projects. However, opportunities always exist for those with an eye to the longer term. Reduced oil prices can help increase efficiency and “cut the fat” across the industry. Savvy companies are focused on identifying new opportunities and making the most out of the assets they own.

Bottom Line



- Lower oil prices impact production patterns and midstream infrastructure development. Midstream infrastructure developers and investors are seeking to better understand the impact of oil prices on specific projects.



- Investors are seeking undervalued and underappreciated assets in order to better position *themselves* in a lower oil price environment. Along with cost reductions and asset spinoffs, vertical integration and joint ventures may better spread risks and reduce costs.



- Oil and gas portfolios are being rebalanced to minimize risk and optimize value.

Oil and Gas Prices—Where We Are and What Matters?

Since the summer of 2014, oil prices have declined by more than 50 percent. For example, West Texas Intermediate oil recently traded below \$45/bbl, whereas it averaged about \$100/bbl from 2011 to August 2014. At the heart of the collapse is simple economics: Supply growth is outpacing demand growth.

The oil supply has increased due to sustained growth in North American crude oil production from Western Canada's oil sands and tight oil and shale plays. Such growth has reduced crude oil imports in the United States. This dynamic also has increased oil product exports from the United States. OPEC and Saudi Arabia's decision not to reduce production has helped maintain the increased supply in global markets. Global oil demand has been hit by an economic slowdown in Asia and continued problems in the European Union. The World Bank projects that a one percentage point decline in China's GDP can reduce global GDP by 0.5 percent and oil prices by nearly two percent.¹ Oil also has been affected by the strengthening U.S. dollar in the second half of 2014.²

Predicting future oil prices is fraught with difficulties. The future movement of oil prices will have broad and major implications for energy markets as well as for the North American and global economies. Although opinions differ on how oil prices are likely to change, understanding how different oil price scenarios impact investments and decision making is of paramount importance.



¹ http://www.worldbank.org/content/dam/Worldbank/GEP/GEP2015a/pdfs/GEP15a_web_full.pdf.

² Compared with the first half of 2014, the U.S. dollar has appreciated by nearly 12 percent. Source. Ibid.



In our December 2014 “Quick Take” article, we discussed the results from proprietary modeling for a set of specific long-term oil price scenarios (\$100/bbl, \$80/bbl, and \$60/bbl). In this white paper, we will discuss the implications, strategies, and opportunities in the oil, natural gas, and natural gas liquids (NGLs) sectors.

Oil Sector: Strategic Implications and Opportunities

Exhibit 1: Oil Sector Implications, Strategies, and Opportunities

IMPLICATIONS	STRATEGIES	OPPORTUNITIES
<ul style="list-style-type: none"> Oil sands production growth has declined as fewer marginal opportunities are undertaken. Growth in oil production in the Permian and Bakken basins will decrease, further impacting regional infrastructure development. Planned pipelines to move N.A. crude to markets may be delayed or cancelled. Reduced need for well drilling equipment and services will effect provider revenues and margins. Producers benefit from lower production costs. Railroad companies may benefit if competing pipelines do not materialize; however, reduced production growth can limit overall rail transport growth. 	<ul style="list-style-type: none"> Producers should reconsider the optimal portfolio of lease holdings and drilling plans in the reduced price environment. Midstream developers should consider the additional risks of investing oil, gas, or liquids focused projects. Oil and gas service companies should carefully manage cost and workforce reductions to maintain profitability while positioning for longer term opportunities. Consolidation and refocusing of workforce might be necessary to control costs. 	<ul style="list-style-type: none"> Stronger companies may be able to acquire under valued assets. Producers with strong balance sheets can purchase reserves at a lower price. Midstream investors and companies may have opportunities to purchase assets from those needing cash. Vertical integration and joint ventures should be considered to spread risks and costs.

Exhibit 2: Oil and Lease Condensate Production and Midstream Infrastructure Needs (2015–2025)

Long-term Oil Price (2013\$/bbl)	Average Annual Oil and Lease Condensate Production (MM bbl/d)			Cumulative Midstream Investment (billions of 2013\$)		
	U.S.	Canada	U.S. and Canada	U.S.	Canada	U.S. and Canada
\$60	8.9	3.7	12.6	61	16	78
\$80	9.8	4.5	14.2	81	40	121
\$100	10.6	4.8	15.5	107	53	160

Source: ICF Modeling Suite (2015)



Given the wide range of potential production impacts, oil producers in North America need to consider the best portfolio of their lease holdings across different plays as well as within plays.

ICF's analysis indicates that crude oil and lease condensate production will increase to 13.2 million barrels per day in 2015. Then, depending on the level of long-term oil prices, the average production during the next decade can either decline or increase (Exhibit 2). With lower oil prices, fewer marginal investment opportunities will be undertaken, and oil production from North America will slowly decrease. Midstream investment in the U.S. and Canadian oil sector could vary by \$80 to \$160 billion during the next decade.

Canadian oil sands production also is likely to drop with sustained low oil prices. Under a long-term \$60/bbl oil price scenario, oil sands production will essentially be flat (relative to 2015 production) with few new investments. In comparison, if the oil prices return to \$80/bbl by the end of 2015, then oil sands production will continue to increase (but at a slightly smaller rate). Growth of oil production in the Permian and Bakken basins also will decrease under lower oil prices.

Given the wide range of potential production impacts, oil producers in North America need to consider the best portfolio of their lease holdings across different plays as well as within plays. Producers already are focusing drilling activities in the most economical areas of their holdings. Such refocusing will be for ensuring profitability during the period of low oil prices. The optimal portfolio should consider how lower production costs improve the economics of oil production. The focus of investments in oil exploration also will change; e.g., exploration in offshore Atlantic Canada is likely to be infeasible under low oil prices.

Oil field service providers are seeing lower revenues and margins. During the past six months, Halliburton, Schlumberger, and National Oilwell Varco have experienced significant stock price drops. These companies are carefully managing cost and workforce reductions to maintain profitability—based on their expectations of relatively low near-term oil prices. However, reducing the workforce too quickly could prevent companies from taking advantage of a faster rebound in oil prices.

Along with cost reductions and asset spinoffs, vertical integration and joint ventures can be considered in order to better spread risks and costs. Producers and service companies can acquire low-cost assets and undervalued companies—e.g., Halliburton acquired Baker Hughes in November because of cost synergies and similar geographic footprints and key product lines, thereby allowing Halliburton to broaden its services with relatively lower costs. Oil pipeline owners and investors looking to reduce risks could consider diversifying assets by investing in or acquiring natural gas pipelines. On the other hand, gas-only transporters may want to consider acquiring undervalued assets in the oil and liquids space. Investors with a longer timeframe can certainly benefit from taking a contrarian view in specific cases.

Oil price changes also will impact midstream infrastructure plans, particularly in pipelines and railroads. Investors should consider how best to invest in oil, gas, and NGL projects, each of which is impacted differently under varying oil price scenarios. For example, planned pipelines to move North American crude to refineries in the Gulf Coast and to the Canadian East and West Coasts for export may be delayed or cancelled. Such delays and cancellations will have longer term impacts for producers.

Producers and refiners have used railroad companies to take advantage of the lack of pipeline infrastructure in some areas. Railroads also provide optionality to producers and refiners, despite the relatively higher cost of rail transport, compared with pipelines. Under sustained low oil prices, railroad companies may benefit as investors shy away from higher risk pipeline projects. However, more expensive rail transport may reduce the netback to the wellhead, which can limit the overall rail growth potential.



Natural Gas Sector: Strategic Implications and Opportunities

Exhibit 3: Natural Gas Sector Implications, Strategies, and Opportunities

IMPLICATIONS	STRATEGIES	OPPORTUNITIES
<ul style="list-style-type: none"> Reduced gas production results from oil and wet plays. Delays in midstream development from wet plays occur. Reduced gas demand growth (LNG, petchem, oil sands) occurs. Gas demand for power generation will likely not be affected. Low oil prices are expected to lead to higher natural gas prices over time. 	<ul style="list-style-type: none"> Producers need to consider the optimal portfolio of production areas, considering the benefits from the reduced drilling costs. Midstream developers and investors should reevaluate the mix of assets in their portfolios, while rationalizing capital expenditures toward more robust investments. LNG developers should attempt to accelerate contracts, because early movers have greater advantages. Producers and midstream players should plan for better diversification to deliver gas to multiple sectors and consumers. 	<ul style="list-style-type: none"> Stronger companies may be able to acquire low-cost assets, including oil and NGL assets. Major dry-gas plays (particularly in Marcellus) and the infrastructure serving these plays will increase in value over time. Vertical integration and joint ventures should be considered to spread risks and costs.

Exhibit 4: Natural Gas Production and Midstream Infrastructure Needs (2015–2025)

Long-term Oil Price (2013\$/bbl)	Average Annual Production (Bcfd)			Cumulative Midstream Investment (billions of 2013\$)		
	U.S.	Canada	U.S. and Canada	U.S.	Canada	U.S. and Canada
\$60	82.1	13.1	95.2	153	14	167
\$80	85.8	15.2	101.0	201	47	248
\$100	87.5	15.9	103.4	219	56	274

Source: ICF Modeling Suite (2015)

Different oil price scenarios yield both strengths and weaknesses in the natural gas sector relative to the North American oil sector. In fact, the relationship between natural gas prices and oil prices is of particular interest, a topic that will be covered in an upcoming ICF “Quick Take” article.

Under sustained lower oil prices, associated gas production from oil-directed wells will decrease as producers realign and reduce capital expenditures for new drilling programs (Exhibit 4). However, changes in gas production will vary across different shale plays. For example, gas production from the Marcellus and Utica shale plays will continue to grow even under the sustained low oil price scenario;



however growth in gas production will decline in the Permian, Bakken, and the Eagle Ford basins. Several companies in Eagle Ford and Bakken have slashed planned 2015 capital expenditures from 20 to 60 percent.

Producers are committing their capital expenses to low-risk, more profitable assets, although existing drilling contractual requirements also may influence investment decisions. Different oil price scenarios may result in different optimal portfolios of production areas and other assets that can enable producers to better ride out the low oil price period. Understanding the feedback from lower drilling costs and those regional economies more resilient to oil price reductions also will be critical for producers and investors.

During the past few years, producers and investors have focused significantly on the wetter and oil portions of the North American shale plays, comforted by the relatively high and stable oil prices. However, a sustained period of low oil prices will likely shift production toward drier portions, increasing gas-directed drilling to meet the growing demand for LNG exports and power generation. Those holding drier assets (e.g., in Northeast Marcellus) may see their value increase over time if low oil prices persist. Such changes can have dramatic impacts on the already strained midstream infrastructure in a number of shale areas.

Low oil prices also will affect gas demand from LNG and the petrochemical industry. LNG export projects from the U.S. Gulf Coast have been relatively robust, given that several of the LNG plants rely on long-term tolling agreements. Integrated projects such as those in British Columbia (or other regions and countries where gas resources are developed primarily in support of LNG projects) are more likely at risk. Global demand for LNG also will decrease under a low oil price scenario, because international buyers (particularly in Asia) have less incentive to switch to natural gas. They will be less likely to deviate from their current oil indexed contracts. In general, North American LNG projects with long-term contracts or already under construction will have first mover advantage. Project developers need to get contracts in place quickly and develop a gas supply portfolio that demonstrates competitive economics for LNG buyers.

Gas demand from the residential, commercial, industrial, and power sectors is unlikely to be impacted by lower oil prices.

Gas demand from the residential, commercial, industrial, and power sectors is unlikely to be impacted by lower oil prices. Environmental regulations in the power sector continue to drive gas demand growth over time, and oil/gas competition in other markets is limited. Most of the demand changes are market reactions to changes in natural gas prices and fuel substitution.

Midstream investment strategies must address the challenge of aligning investments with stable markets and the producer-focused plays. For example, pipelines built to support power plants and gas utilities are likely more stable than those associated with supporting petrochemical and LNG demand. Investors will need patience and a greater focus on production hot spots in order to seize emerging opportunities.

NGL Sector: Strategic Implications and Opportunities

The NGL sector depends on drilling for oil and gas because no one “drills for NGLs” alone. Production growth of NGLs will continue even under a sustained low oil price scenario. If oil prices remain at \$60/bbl for an extended period of time, ICF projects that total NGL production would increase from 4.2 million barrels per day (MMbpd) in 2015 to 5.2 MMbpd in 2020. In comparison, if oil prices rebounded back to \$100/bbl very quickly, NGL production by 2020 could be 5.7 MMbpd. Production in 2015 is likely to exceed that of 2014, as predecline development activities are completed and new production comes online.



Exhibit 5: NGLs Sector Implications, Strategies, and Opportunities

IMPLICATIONS	STRATEGIES	OPPORTUNITIES
<ul style="list-style-type: none"> Growth in NGLs production will decrease; Bakken and Western Canada production will be more strongly affected than other major basins. Changing production and demand patterns will affect NGLs transportation build out with greater infrastructure concentration in the Marcellus/Utica area. Low oil prices can reduce the attractiveness of ethane as feedstock for petro-chemicals and the need for PDH capacity growth. Demand for NGLs rail transport will likely continue to fare well. 	<ul style="list-style-type: none"> Western Canadian and Bakken producers should reconsider how to optimize their holdings. Investors, owners, and suppliers of PDH facilities and ethane crackers are likely to slow down investment. Midstream companies should reevaluate the need for Y-mix and pure NGL pipeline capacity from Marcellus-Utica, and the Bakken-Western Canada basins to Mt. Belivieu. N.A. LPG/ethane exporters could be affected by reduced global demand due to lower Chinese GDP growth and lower naptha prices. 	<ul style="list-style-type: none"> Stronger companies across the spectrum have a great opportunity to acquire low-cost and under valued assets. Producers in the Marcellus-Utica area are likely to retain their investment value assets due to the increased concentration of production in the area. Vertical integration and joint ventures should be considered to spread risks and costs.

Exhibit 6: NGLs Production and Midstream Infrastructure Needs (2015–2025)

Long-term Oil Price (2013\$/bbl)	Average Annual NGL Production (MM Bpd)			Cumulative Midstream Investment (billions of 2013\$)		
	U.S.	Canada	U.S. and Canada	U.S.	Canada	U.S. and Canada
\$60	4.2	0.8	5.0	33	5	38
\$80	4.5	0.9	5.4	37	8	45
\$100	4.7	0.9	5.6	43	10	53

Source: ICF Modeling Suite (2015)

Demand for consumer propane will increase due to lower oil prices. In the long term, lower oil prices reduce the incentive to convert petrochemical facilities to ethane and propane feedstock. However, the current very low propane prices are allowing for increased petrochemical use of propane. In addition, lower economic growth in China and Asia will likely reduce demand growth for polypropylene itself, and investors and developers of propane dehydrogenation facilities (PDH) and ethane crackers are likely to slow down their plans for new projects.

Oil price changes also will impact the need for new NGL infrastructure, particularly Y-mix and purity pipelines. As production shifts away from more expensive plays, greater concentration of infrastructure



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- Expert Witness Testimony and Litigation Support
- Financial Modeling and Risk Assessments
- Environmental Impact Assessments

build-out will likely be focused in the Marcellus-Utica area. Continued price suppression for ethane and the challenges of ethane rejection could imply that new crackers are needed in the Marcellus-Utica area. Investments in this area are likely to retain their asset value, but only if outlets for ethane are developed over time.

In Bakken, current lack of pipeline capacity is forcing NGLs to be shipped on rails, potentially creating a greater demand for railroad capacity (despite its higher costs). LPG/propane export projects in the United States and Canadian West Coast as well as the Gulf Coast need to assess how the global demand for North American LPG will change under more volatile oil price scenarios. Sustained low oil prices can occur due to continued lower Asian economic growth, which could mean lower demand for LPG exports from North America. Hence, investors need to pay close attention to the economics of LPG/propane export.

Conclusion

Producers, midstream and downstream developers, and investors across North America have benefitted from a period of relative stability in the oil and gas markets. The relatively high prices during the last several years, combined with advances in technology and supportive policy and regulations, enabled the market to expand significantly. The current drop in oil prices has indeed put the brakes on some of these investments, and potential risks have increased. Opportunities exist for those with good balance sheets and an eye to the longer term. Investors need focus on such opportunities and make quick decisions based on scenario analysis.

ICF works for private companies, industry associations, investors, and government stakeholders throughout the petroleum, natural gas, and NGL supply chains. We have the tools, resources, and insights to help all stakeholders navigate these constantly changing markets. We invite your comments and welcome the opportunity to support you.

ICF Oil and Gas Modeling Tools

Gas Market Model (GMM®)—GMM® is an internationally recognized North American gas market model that is capable of forecasting gas market conditions based upon actual and scenario-based changes in the market.

Detailed Production Report (DPR)—The DPR is a gas and oil vintage well production model that provides a complete outlook for North American natural gas, NGLs, and crude oil production. DPR projects output for more than 50 production basins.

Midstream Infrastructure Report (MIR)—The MIR provides a granular look at regional infrastructure needs, costs, and opportunities throughout North America, including capital investment opportunities and shifts in midstream projects based on changing supply, demand, and transportation dynamics.

Natural Gas Liquids Transport Model (NGLTM)—NGLTM projects the annual transport of North American NGLs at various submarkets. ICF is able to project the movement of raw mix and purity products in addition to exports and imports of the commodities.

Crude Oil Transport Model (COTM)—COTM allows ICF to project the movement of crude oil around North America based on existing and projected crude oil infrastructure. In tandem with ICF's DPR, COTM solves for crude oil balances at more than 32 submarket regions.

Propane Database and Forecasting Model (PDFM)—PDFM provides detailed forecasts of U.S. propane demand by sector and state.



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