

The rise of the midstream

Shale reinvigorates midstream growth



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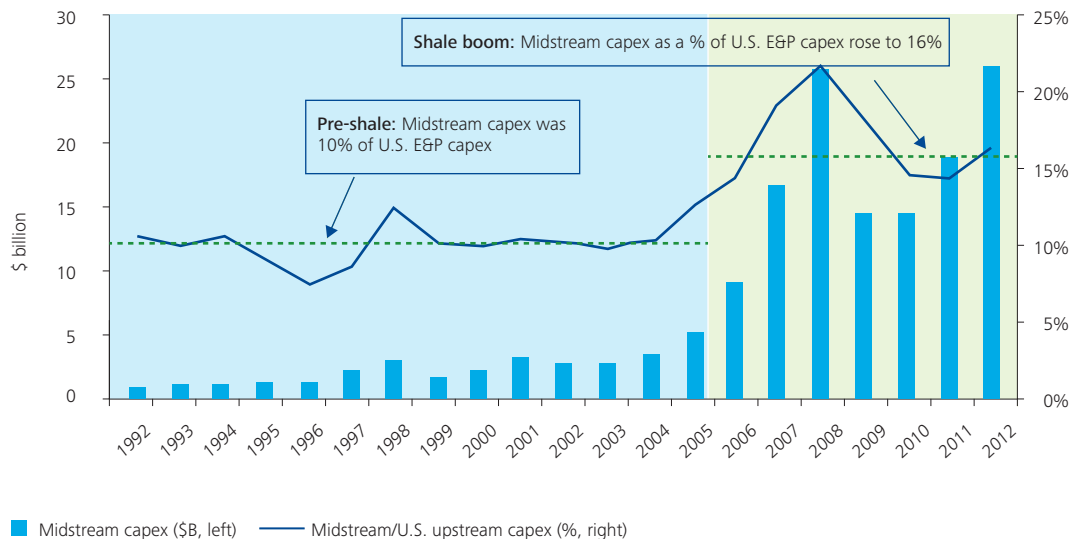
Out of the shadows

The U.S. oil and gas industry is in the midst of a renaissance. The perfect marriage of hydraulic fracturing and horizontal drilling has unlocked previously untapped reserves, pushing domestic production in 2012 to its highest level in 16 years.¹ While the rising output has benefited exploration and production (E&P) companies, it also has fueled a demand for pipelines, gathering systems, and processing facilities. For decades, the midstream sector² responsible for this infrastructure operated in the shadow of the E&P

companies, but in the past seven years, the shale boom has enabled the midstream sector to come into its own.

During 2006–2012, midstream companies invested almost twice the amount of capital they did between 1992 and 2006, thereby increasing the sector's capital expenditure (capex) intensity relative to that of upstream companies (Figure 1). This investment has been acknowledged by the market, reflected in a threefold increase in midstream

Figure 1. U.S. midstream capex, 1992-2012



Notes:

- Data is based on publicly listed companies only (existing and acquired).
- Companies are classified as midstream or upstream, based on their primary business.
- Midstream capex is of operating partnerships rather than of general partners or sponsors. Midstream capex of E&P independents and integrated oil companies (IOCs) is not adjusted.

Sources: FactSet, Securities and Exchange Commission filings, and Deloitte analysis.

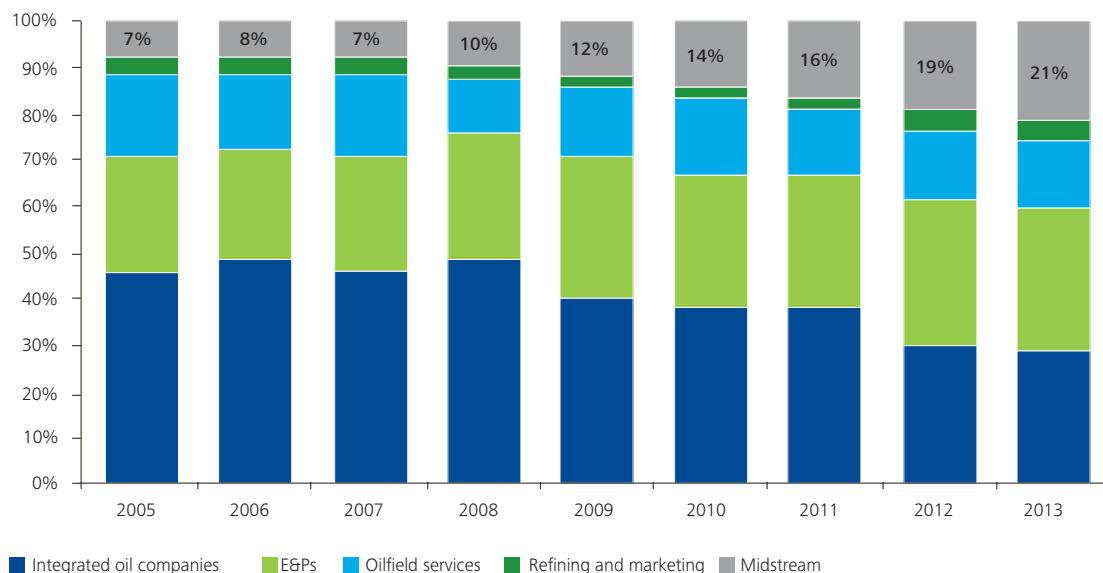
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companies' share of total U.S. oil and gas company enterprise value since 2005 (Figure 2). The midstream sector is now the third largest sector of the U.S. oil and gas industry, behind supermajors and large independents. The largest midstream company, Kinder Morgan, with an enterprise value of \$110 billion, is the third largest energy company in North America, behind two supermajor oil and gas companies.

The rise of the midstream sector is illustrated by the increase in its company valuations. Nearly 25 midstream companies have an enterprise value in excess of \$5 billion, up from seven companies in 2006.

This surge in growth comes at a time when the midstream sector had been expected to enter an era of maturity. After a wave of consolidation that began in the late 1990s, many forecasts predicted U.S. pipelines would be built out by about 2006. Before the shale boom, domestic oil and gas supplies had been in more accessible areas and tied to existing pipeline infrastructure. But now, increasingly high capital investment is being required to connect newfound resources with refineries and processing plants.

Figure 2. Enterprise value share of U.S. origin oil and gas companies



Notes:

- Midstream enterprise value is of operating partnerships rather than of general partners or sponsors.
- Midstream segment excludes companies in the distribution segment.
- 2013 data comprises the six month period ended, June 30, 2013.

Sources: FactSet and Deloitte analysis.



It's only just begun

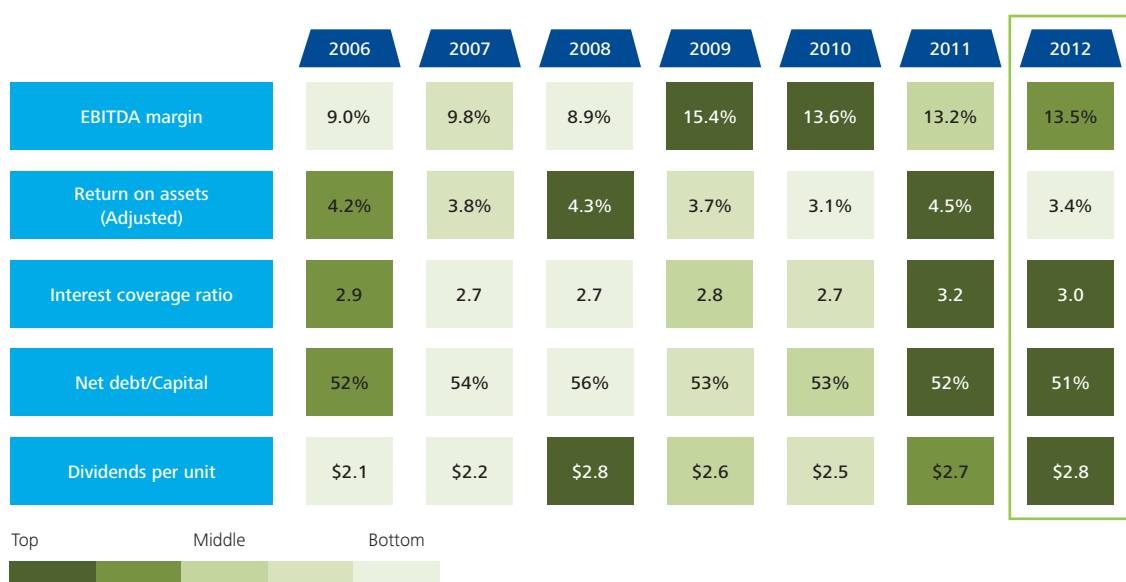
Despite this rise in its capital intensity, the sector is just beginning to meet the needs of E&P companies in areas like North Dakota's Bakken shale formation. According to the latest available annual data (2011) from the U.S. Energy Information Administration (EIA), about 35 percent of the Bakken natural gas production had to be flared or was otherwise not marketed because of the insufficiency in the infrastructure required to store or transport it. In South Texas' Eagle Ford Shale, production is exceeding pipeline and storage capacity, and rail shipments are on the rise due to the current lack of pipelines. Because of tight pipeline capacity, the use of rail, truck, and barge to move crude nationwide is at its highest since the government began keeping records in 1981.³ Meeting these growing infrastructure needs may require more than \$200 billion in additional investment by 2035.

The sector is capable of meeting this significant capex requirement, as its past growth has not come at the expense of its balance sheet. The sector's return on assets is comfortable, and average profit is three times greater

than interest expense, despite its rising capex. Dividends, too, have increased, a sign the sector is not stretching its collective balance sheet simply to please investors (Figure 3).

Although initially a play for smaller independent upstream companies, the shale boom has caught the attention of supermajors and large independents, luring them back to the United States after decades of their searching for oil in other parts of the world. ExxonMobil's purchase of XTO Energy, for example, underscored a renewed interest in domestic reserves, and other large players, such as Shell, have invested billions in shale plays. Even large independents are following the trend. Anadarko Petroleum sold a portion of its stake in a natural gas field off Mozambique and indicated it would invest further in developing its U.S. onshore properties.⁴ This sort of onshore demand, now coming from large, financially sound players, is likely to keep the momentum going, driving the need for additional infrastructure over the next decade or two.

Figure 3. U.S. midstream sector's performance, 2006–2012



Sources: FactSet, Deloitte analysis.

Regaining lost ground

With rising production and crude prices hovering around \$100 per barrel, E&P companies have turned to more costly — and less efficient — means of transporting production from the wellhead. From 2011 to 2012, the number of oil deliveries by truck to refineries grew 38 percent, while rail shipments quadrupled and barge deliveries rose 53 percent.^{5,6}

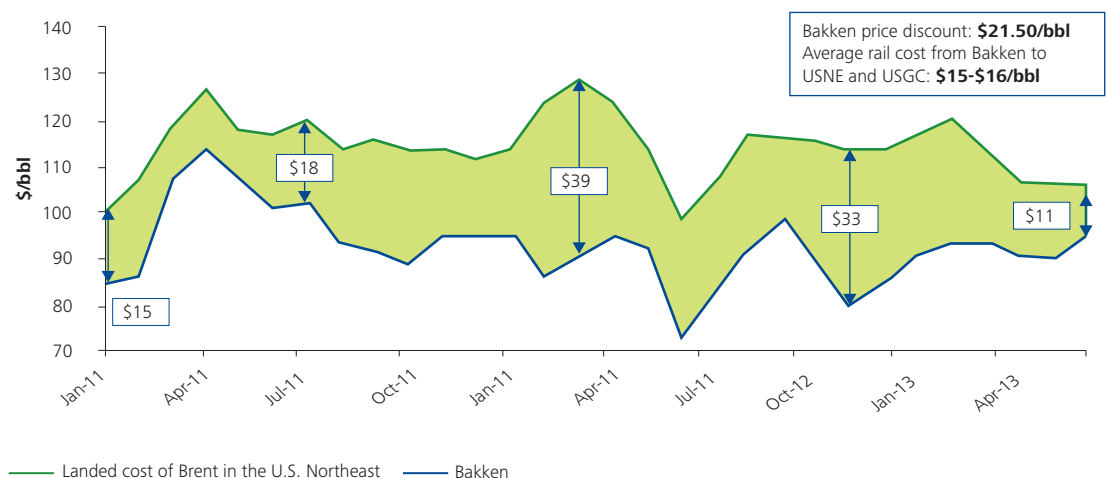
But the sector is facing higher regulatory scrutiny and public opposition as it shifts its focus from remote regions, such as North Dakota and South Texas, to more heavily populated areas such as the Marcellus in Pennsylvania and New York and the Utica in Ohio. Recent high-profile pipeline leaks, along with the political controversy surrounding the Keystone XL pipeline from Western Canada to the U.S. Gulf Coast, have increased public skepticism about pipeline projects.

Despite the sector's current reliance, it is unlikely that rails, trucks, and barges will continue to be the preferred methods of transport as more pipelines are built. Until now, high crude price differentials between hubs have

enabled shale producers to absorb the greater costs of alternative transportation. Bakken crude with landed cost at the Northeastern United States, for example, traded at a significant discount to Brent prices because of midstream capacity constraints. In 2011 and 2012, that discount averaged \$21.50 per barrel, which was greater than the average rail cost of \$15–\$16 per barrel to the Northeastern United States and U.S. Gulf Coast. New pipelines to the U.S. Gulf Coast, however, cut the Brent-Bakken discount to \$11 per barrel in early 2013, an indication that other forms of transportation may become too costly to be a long-term solution for a lack of pipeline capacity (Figure 4).

Although rail's flexibility, faster scalability, and shorter term contracts are appealing to producers and consumers, the September 2013 train explosion in Quebec exposed the risks of shipping crude oil by rail. Pipelines are also not a clear-cut winner for crude oil transit when considering their history of leaks and spills, as well as their initial investment cost. However, pipelines' score on two of the most important aspects — cost and safety — is generally considered to be higher than that of rail.

Figure 4. Brent-Bakken spread, 2011 to July 2013



Notes: Landed cost of Brent at the Northeastern United States equals Brent price plus average shipping cost per barrel via very large crude carriers (VLCC) from the United Kingdom to the Northeastern United States; VLCC capacity is assumed as 250,000 deadweight tonnage.

Sources: Bloomberg, Tesoro Corp., Investor Presentations, and Deloitte analysis.

Charting the growth cycle

The growth of the midstream sector is largely driven by the volume of hydrocarbons that need to be processed and transported. This midstream volume can be broadly defined as a function of four fuels — crude oil and condensates, petroleum products, natural gas, and natural gas liquids (NGLs) — and by the role of the midstream sector across each fuel (Figure 5).

For crude oil and condensates, for example, the midstream sector's role is largely limited to the transporting of production meant for domestic consumption and to the partial importing (as the rest of the imports are directly undertaken by coastal refiners, bypassing the midstream sector's service) and marginal exporting of condensates via pipeline to Canada. For natural gas, the sector's role cuts across all three of the growth determinants — the transporting of domestic production and the complete exporting and importing of products.



Figure 5. Growth determinants of the U.S. midstream sector

	Production for domestic consumption	Production for exports	Imports
Crude oil and condensates	✓	Marginal ¹	Partial ³
Petroleum products	✓	Marginal ²	✓
Dry natural gas	✓	✓	✓
Natural gas liquids (NGL)	✓	✓	✓

Notes:

¹ Crude oil and condensates export to Canada.

² Petroleum products export largely from coastal refiners, except liquid petroleum gas, alternative transportation fuels, and blending components, which export to Canada via pipelines.

³ Pipeline imports from Canada only; the rest is sourced by coastal refiners.

Source: Deloitte analysis.

The sum of these growth determinants provides an estimate of the midstream sector's market size, which amounted to nearly 14.5 billion barrels of oil equivalent (BBOE) in 2012 (Figure 6). According to this summation, which is based on EIA's projections for oil prices under three cases — reference, high, and low — crude oil and NGLs will drive the sector's high growth until 2016 and increase the sector's market size to 15.5 BBOE.

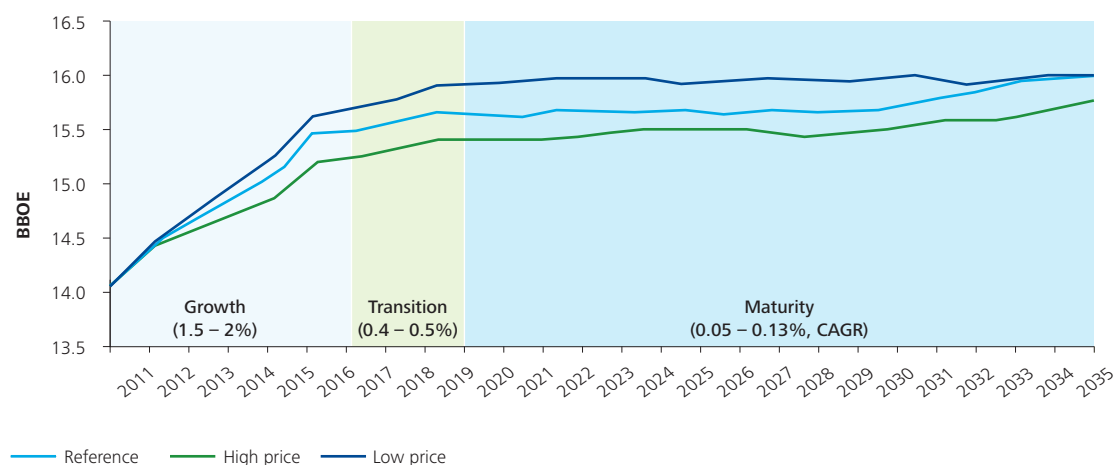
The sector will then likely enter a transition phase where depletion of oil's sweet spots⁷ will coincide with the reignition of gas growth. In this phase, recovery in natural gas prices, the commencement of LNG exports, and increased demand from gas-powered industrial sectors will

drive the growth of the midstream sector. Concurrently, NGLs will grow faster than any other commodity due to the start-up of new petrochemical plants and NGLs' significant export potential, mostly for propane.

In all three cases, the EIA projects the midstream sector will likely enter a maturity phase by the end of this decade. High-productivity shale plays will largely be explored and depleted, reducing demand for new infrastructure and intensifying price competition among midstream operators.

Knowing this, the sector is faced with two questions: One, how will this high growth be funded? Two, what will be done when the growth rate slows down?

Figure 6: Sector's volume growth cycle, using EIA's forecast



Notes:

- Crude oil imports from Canada are based on EIA's 2012 Annual Energy Outlook (AEO).
- Petroleum product imports include unfinished oils, blending components, and finished petroleum products.
- NGL exports from the United States are estimated from the Canadian Energy Research Institute (CERI) study on "Natural Gas Liquids in North America: Overview and Outlook to 2035"; due to limited availability of data, NGL exports are assumed to be the same across all the three cases.

Sources:

- EIA's 2013 AEO, 2012 AEO, and data tables (downloaded on May 30 and May 31, 2013).
- CERI. "Natural gas liquids in North America: Overview and Outlook to 2035". Study No. 130. July 2012.

Funding the growth

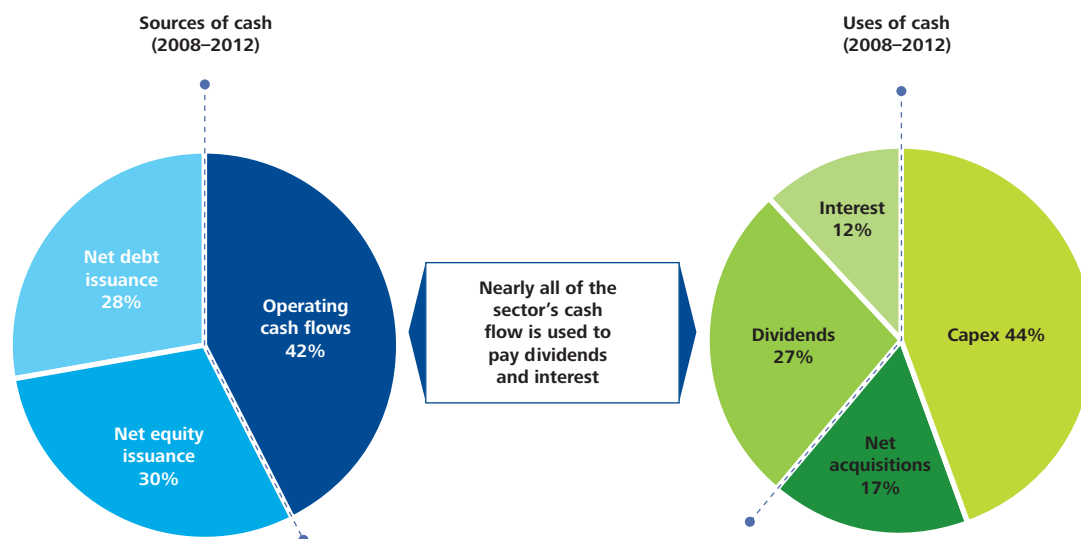
To better understand the sector's funding needs, it is important to understand the composition of its assets. The midstream sector's assets consist of two distinct segments — local and national. The local component is made up of oil and gas-gathering and -processing systems. This sector faces the greatest demand due to the increasing number and higher initial production rates of shale wells. The national segment refers to the system of pipelines that move hydrocarbons around the country, much like the interstate highway system. This system, too, has faced increased demand from the hydraulic fracturing boom, which increased U.S. oil production to 7.5 million barrels a day in July 2013 from 5 million barrels a day just five years earlier.⁸ In addition to new construction, some pipeline operators have repurposed existing lines, reversing the direction of their flow and tying them into new producing areas, such as the Bakken, to move oil southward and eastward to refineries. Such conversions help temporarily ease bottlenecks, but they will not replace the need for additional capital investment.

To fund and build this local and national system of pipelines, midstream companies depend heavily on external capital, as they distribute much of the cash flow they generate to investors (Figure 7). Since 2008, more than 95 percent of the sector's capex and acquisitions have been funded through equity and debt.

Thus, the midstream sector relies on two sources for early-stage funding: E&P company build-outs and private equity (PE) financing. In the build-out scenario, a producer pays for the small-scale local infrastructure, such as the feeder and gathering and processing systems, to handle production from its wells. Once the wells begin producing, the E&P company looks for a midstream buyer for the assets.

PE serves a similar role in funding the construction of gathering systems and a large-scale national infrastructure, including interstate or long-haul pipelines. After the midstream investment gains critical mass, PE investors

Figure 7. Midstream sector's sources and uses of cash



Sources: FactSet, Deloitte analysis.

often seek an exit through an initial public offering (IPO) or sale to an existing midstream company. Companies financed through this process have higher exit multiples than do other PE investments because of the unique nature of their IPOs. Public investors buying into the offering, however, are typically wary of early-stage investors who sell more than half their stake in a company. To ease this common concern, some PE firms hold onto their investments longer than their normal duration. They do still, however, have the option of selling their assets to a strategic buyer in order to make a complete exit. However, the concern here is, can the midstream sector attract big investors, even if interest rates go up?

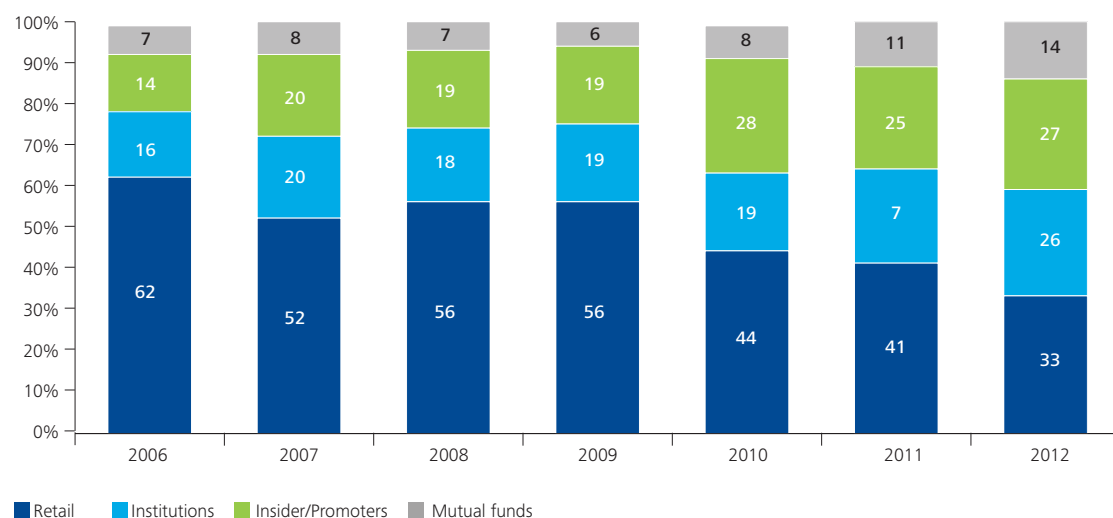
Benefitting from the MLP model

The MLP structure mitigates much of this concern by enabling midstream operators to monetize assets and realize a higher-valuation premium in part due to the MLP's U.S. federal income tax treatment. An MLP is not subject to

U.S. federal income tax at the MLP-entity level, but rather, the U.S. federal taxable income/loss flows through to the MLP's unitholders and is included in the tax return of the unitholders.⁹ Unlike the treatment of traditional publicly traded corporations, this treatment eliminates a level of U.S. federal income tax. Further, while the unitholder is taxed on its allocation of income/loss from the MLP, the MLP's distributions to its unitholders are not taxed. Currently, due to the accelerated-depreciation deductions afforded to MLPs, MLPs often distribute significantly more cash than the amount of taxable income allocated to its unitholders.

Originally, MLPs were small and attracted mostly retail investors, many of whom were looking for steady returns. But over time, more institutions have moved into the investor space. By 2012, only 33 percent of MLP units were held by retail investors, compared with 62 percent in 2006 (Figure 8).

Figure 8. Midstream MLPs shareholding pattern



Sources: FactSet, Deloitte analysis.

This larger, more robust MLP market has enabled companies to execute larger transactions. The sector now has access to an abundance of low-cost capital, steady customer demand, and the ability to scale its operations quickly while offering a viable exit strategy for early-stage investors.

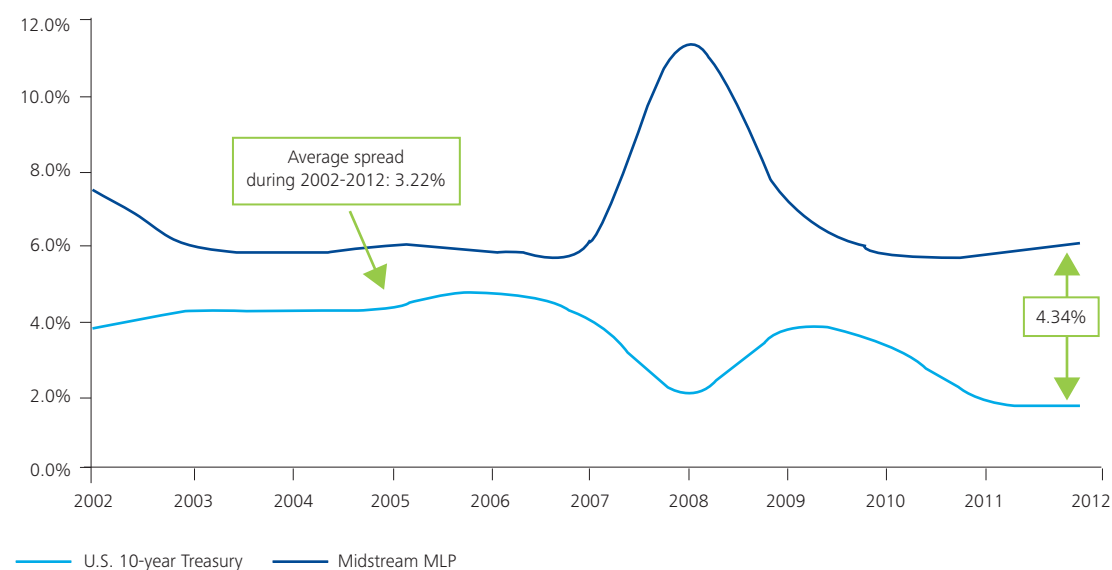
So far, public markets have been receptive, and MLPs have been able to increase their asset base and expand their distributions with little sign that investors' appetite is waning. The MLP remains the bedrock of the midstream sector's capital structure, with 14 deals raising \$4.9 billion through IPOs in 2012, the largest number of deals and the biggest proceeds in three years.¹⁰ That could change, though, if interest rates rise significantly.

Overcoming interest rate challenges

In 2012, midstream MLPs delivered an average yield of 6.1 percent, which was 4.3 percentage points (pps, "High Case") higher than the 10-year Treasury yield. That spread exceeds the average of 3.2 pps ("Reference Case") above the 10-year Treasury yield during the past decade (Figure 9).



Figure 9. Midstream MLP vs. U.S. 10-year treasury yield



Sources: FactSet, Bloomberg, Deloitte analysis.

Economists predict the yield on 10-year Treasury notes may increase during the next four years to 3.75 percent. To maintain its High Case spread of 4.3 percentage points over Treasury notes the midstream MLP yield would have to rise above 8 percent, which would require distributions to grow by an average of 7 percent annually (Figure 10).

Figure 10. Required growth in MLP yield and distributions

Years	Projected 10-year treasury yield	Reference case (treasury + 3.2%)		High case (treasury + 4.3%)	
		Required yield	Required distribution growth	Required yield	Required distribution growth
2012A	1.76%	6.10%	-	6.10%	-
2013E	2.24%	5.46%	0.0%	6.58%	7.9%
2014E	2.64%	5.86%	0.0%	6.98%	6.1%
2015E	3.12%	6.34%	3.9%	7.46%	6.9%
2016E	3.74%	6.96%	9.8%	8.08%	8.3%
Average			3.3%		7.3%

Notes:

- MLP unit price is assumed constant under both cases as MLPs largely distribute what they earn.
- Projected U.S. 10-year treasury rate is based on Oxford Economics estimates.
- In the years column, A refers to actual and E refers to estimated.

Sources: FactSet, Oxford Economics, Deloitte analysis.

Growing distributions by 7 percent in a rising interest rate scenario would require the sector's payout rate to rise from the current 80 percent to 93 percent in 2016. Such an increase is unlikely given its significant capex requirements. We expect that although the sector will face pressure to maintain its current spread of 4.3 percentage points, it will likely gravitate toward the Reference Case of 3.2 percentage points. Spreads have already come under pressure. In the first half of 2013, for example, the spread has already declined to 3.6 percentage points.

Yet even maintaining this spread will require midstream MLPs to increase overall yields to attract investors by offering more yield-bearing options in a rising interest rate environment. Ultimately, this pressure to increase yield will

affect the sector's cost of capital. In the first half of 2013, the sector's weighted-average cost of capital rose by 70 percentage points because of increasing bond yields and a rise in the market's expected rate of return.

A higher cost of debt generally exerts a negative impact on an sector's net income. However, the midstream sector's debt structure is nearly 75 percent fixed rate, so the impact of higher interest rates is more on its fair value of debt and less on its net income. Deloitte's analysis suggests the sector's net income will decline by approximately 1.5 percent if the sector's effective interest rate rises by 50 percentage points.

A rise in interest rates will strain the industry's current high-yield spread over Treasury notes and increase the cost of new projects, but it will not dilute the sector's strong attractiveness and performance because it will remain fortified by its fixed-rate debt structure, strong credit ratings, and built-in fee escalation clauses in contracts.

Tax considerations

In addition to interest rates, MLPs face another concern: changing tax laws. While it appears unlikely Congress will enact one-off changes which will affect the current midstream sector structure, the broader tax benefits that allow MLPs to deploy capital efficiently do make it a possible target for future federal tax code changes.

Even if the current federal tax benefits remain in place, midstream companies will face an array of tax issues at the state level. The proliferation of shale plays in states that had experienced little drilling activity in recent decades has resulted in a patchwork of tax regimes. Historically producing states continue to provide a more welcoming environment for oil and gas development, whereas states for whom such activity is a more recent development, especially in the Northeastern United States, are choosing to increase tax rates and do away with exemptions in order to raise revenue.^{11,12} In some cases, these states are relying on the burgeoning oil and gas business to rebuild their struggling economies, even if their tax structures are not set up to accommodate growth.

Buying the growth

As the sector matures and price competition increases, returns will narrow and the lowest-cost operators will prevail, paving the way for consolidation.

The sector is highly fragmented, as reflected in the lower Herfindahl-Hirschman Index (HHI). Although large-cap diversified players have been regaining their market share through acquisitions over the last few years, the index is far below 0.15, on a scale of 0 to 1. An HHI below 0.15 indicates a fragmented sector structure, whereas an index of 1 indicates a concentrated structure.¹³

Among the current midstream companies, large-cap diversified players have the lowest weighted-average cost of capital, at less than 6.5 percent. Mid-sized companies have the highest, at more than 7 percent. Companies with less than \$5 billion in enterprise value may continue to struggle to raise the cash they need to generate returns, which could make them acquisition targets for larger companies in search of buying opportunities to help maintain their growth.

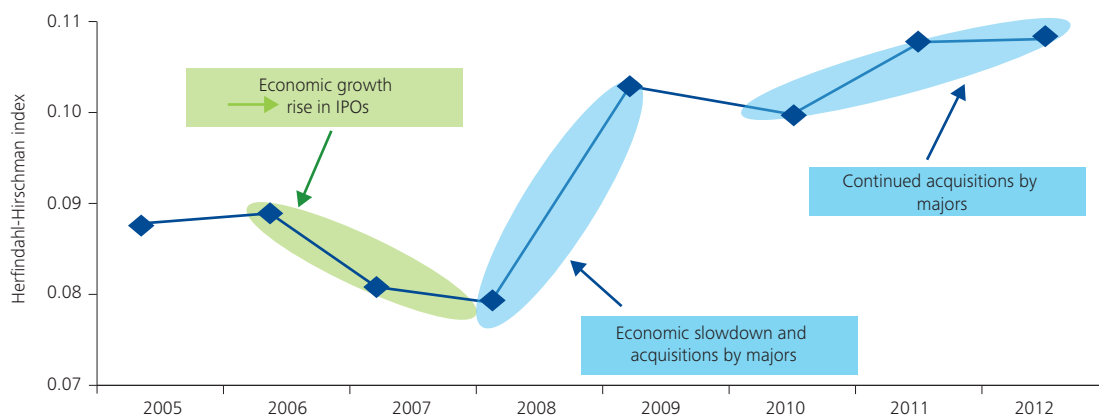
The result will be the emergence of midstream majors, large market-dominating midstream companies that have the size and influence rivaling that of their upstream counterparts. A handful of the largest midstream players will become an essential part of the infrastructure and enjoy a significant market share.

Among the four segments (gathering and processing, natural gas pipelines, liquids pipelines and logistics, and gas storage and terminals) the midstream majors would benefit from buying fragmented and lucrative gathering and processing assets, which represents the first leg of the midstream sector's growth strategy and covers both liquids and natural gas. Companies that own these assets are attractively valued, and are moving toward fee-based contracts that shield them from commodity price volatility, and are building assets in new shale plays only if large acreage is committed by upstream players to ensure their utilization. Kinder Morgan's recent acquisition of Copano Energy for \$3.9 billion, for example, is a step in that direction.

Although the natural gas and liquids pipelines segment and the logistics segment can provide meaningful growth to the majors, they are either highly consolidated and thus present regulatory challenges or are expensive to buy.

The gas storage and terminals (coastal) segment shares the same characteristics, but it additionally provides a new avenue of growth for majors — LNG and NGL exports. Midstream majors could look for joint ventures with upstream players, which would be a win-win for both. The upstream player would reduce its transportation and processing risk, while the midstream company would benefit from a secured supply. Energy Transfer Partners, for example, has entered into an agreement with BG Group to develop an LNG export project in Louisiana, for which it has received approval from the U.S. Department of Energy (DOE).

Figure 11. Herfindahl-Hirschman index of the U.S. midstream sector



Sources: FactSet, Bloomberg, Deloitte analysis.

Expanding into exports



Although there is significant debate about how far and how fast the United States will develop as an energy-exporting nation, it is increasingly accepted that exports will grow and that this growth will require significant midstream infrastructure.

This export build-out will require midstream majors to embrace a larger role. Already, some midstream companies have become partners in export facilities for LNG, and more may follow suit as the federal government approves additional export facilities.

More than 30 project applications have been submitted to the DOE to date, and still more are expected.¹⁴ As more LNG facilities enter service, the midstream companies that invest in them will be drawn into the global market. Natural gas will likely be priced globally, which will mean that

midstream companies will be more vulnerable to geopolitics. Petroleum products, condensates, and NGL exports could also attract interest from midstream majors if domestic production continues to surpass domestic consumption.

However, for MLPs, appetite for growth will stop at the U.S. border. Unlike their E&P counterparts, the midstream business historically has been domestically focused, and many companies' management lacks international experience. They have shown little interest in direct international investment beyond interconnections with systems in Canada and Mexico. Furthermore, the tax benefits that MLPs enjoy in the United States do not apply in foreign jurisdictions. Thus, the sector is likely to remain anchored by its domestic bias.

The midstream of the future

The path from growth boom to maturity will transform the midstream sector during the next two decades. The sector that emerges will hold assets that stretch from Canada to the U.S. Gulf Coast and go beyond pipelines to export terminals and marine transportation.

To gain from this transformation, midstream companies should consider playing a larger role in managing production, as the process of producing and transporting fossil fuels will become more automated. Using better forecasting analytics, the sector will benefit by anticipating demand and delivering customized crude blends and dynamic storage options to end-users.

Within the midstream sector, midstream majors are strongly placed to ride this growth cycle better than are small and medium-sized companies due to their financing prowess, presence across the value chain, and, most important, growing dominance in new and emerging shale plays. Accordingly, in the future, these majors will dominate the midstream sector, but niche opportunities will continue to exist for innovative and opportunistic smaller players. The midstream sector will continue to be critical to helping deliver on the promise of the North American energy renaissance.



Endnotes

- ¹ U.S. Energy Information Administration, "U.S. Field Production of Crude Oil," (Sep. 27, 2013), <http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mcrfps2&f=a>.
- ² In this report, the U.S. midstream sector comprises of companies involved in gathering, processing, transporting via pipelines, and storage and terminals of natural gas and liquids.
- ³ "Pipeline-Capacity Squeeze Reroutes Crude Oil," *The Wall Street Journal*, (Aug. 26, 2013), <http://online.wsj.com/news/articles/SB10001424127887323838204579003093413317418>.
- ⁴ "Anadarko Announces \$2.64 Billion All-Cash Transaction for Portion of Offshore Mozambique Block," news release, Anadarko, (Aug. 25, 2013), <http://www.anadarko.com/Investor/Pages/NewsReleases/NewsReleases.aspx?release-id=1849614>.
- ⁵ "Refinery receipts of crude oil by rail, truck, and barge continue to increase," U.S. Energy Information Administration, (Jul. 17, 2013), <http://www.eia.gov/todayinenergy/detail.cfm?id=12131>.
- ⁶ Refinery Receipts of Crude Oil by Method of Transportation, U.S. Energy Information Administration, (accessed on Oct. 30, 2013), http://www.eia.gov/dnav/pet/pet_pnp_caprec_dcu_nus_a.htm.
- ⁷ "Sweet spots" refers to those areas that have the highest known production rates in a shale play.
- ⁸ U.S. Energy Information Administration, "Crude Oil Production," (Oct. 30, 2013), http://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbbldpd_m.htm.
- ⁹ An MLP may still be subject to state and local income taxes, and/or its investors may be subject to income taxes at the state and local level.
- ¹⁰ "IPO Wave Kicks Off With Trio of MLPs," *The Wall Street Journal*, (Jan. 13, 2013), <http://online.wsj.com/article/SB10001424127887324581504578236113296906792.html>.
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- ¹² "Ohio will raise taxes on shale drillers, Kasich again pledges," *Columbus Business First*, (Nov. 30, 2012). *Columbus Biz First*: <http://www.bizjournals.com/columbus/blog/2012/11/ohio-will-raise-taxes-on-shale.html>
- ¹³ The Herfindahl-Hirschman Index is a measure of the size of firms in relation to the industry and an indicator of competition among them. An increase in the HHI generally indicates a decrease in competition and an increase of market power, whereas a decrease indicates the opposite.
- ¹⁴ U.S. Department of Energy, "Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States," (Oct. 15, 2013), <http://energy.gov/sites/prod/files/2013/10/f4/Summary%20of%20LNG%20Application.pdf>.

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