

US Northeast Gas Outlook/Implications

Soaring Utica and Marcellus Production; Impact on Gas Pipelines

Equity Research View

- **U.S. Gas Pipeline Outlook** — We are seeing a record amount of new pipeline capacity contracts being signed by producers to move natural gas from the Marcellus and Utica to the Gulf Coast. We estimate there is currently 6.5Bcf/day of new export capacity coming online over the next 3 years which will NOT be enough to solve Northeast basis. We estimate these projects have high returns on capital because most of the spending associated with these projects use existing infrastructure.
- **Projects Update** — We profile a number of pipeline projects in the works to address the Northeast gas glut. The key players involved in exporting gas out of the Marcellus are Spectra Energy (SE and SEP), Williams (WMB and WPZ), Kinder Morgan (KMI and KMP), Nisource (NI) and Tallgrass (TEP). We believe a portfolio of these stocks offers investors exposure to projects with high returns, volume growth and little commodity price exposure (only within these projects).

Commodity Research View

- **Production** — Were it not for weather, the Northeast's strong production this year would have caused annual average production to exceed demand, turning the region into a net gas exporter. Output has risen from miniscule levels less than a decade ago to one-fifth of US gas production.
- **Long-Term Demand** — A cold winter has helped ease the expected gas production glut in 2014 in the US Northeast, but that is temporary. New England demand growth could be limited even with coal plant retirements and industrial expansion. Electricity demand growth should stay weak.
- **Storage** — The value of NE storage assets could diminish over time as gas production comes close to meeting peak demand; however, with storage rates in the Northeast and Mid-Atlantic at cost of service levels, we believe utility customers will retain their gas storage rights.
- **Pipeline Infrastructure** — With rapid production growth pushing production above regional demand, infrastructure has become an urgent issue. Current plans to reverse pipelines for export appear insufficient to relieve the growing production glut, unless more pipe reversals take place or production growth slows sharply.
- **Prices** — Infrastructure constraints could push long-dated NYMEX prices higher due to severe regional supply-demand imbalances between now and 2020. Lack of pipeline takeaway capacity in the NE could force the market to rely more on higher-cost Gulf Coast gas. We currently estimate a basis at Dominion South Point and Leidy of \$1.00 and 2.00 per MMBtu through 2018.

- Equities
- Commodities

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See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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Over the last two years, we were concerned that rising Marcellus and Utica production would result in stranded long-haul capacity for large pipelines from the Gulf Coast into the Northeast. However, with our production forecasts calling for 2.0Bcf/day of annual production growth through 2017, these same pipelines will be needed to move natural gas South and West. Instead of revenue and volume reductions for long-haul pipelines, we now see a situation of rising volumes and rising revenues as pipeline operators move to make their lines bi-directional and service both utility customers in the Northeast and producers anxious to improve their netbacks in the Marcellus and Utica.

We believe the key players involved in exporting gas out of the Marcellus and Utica will be Spectra Energy (SE and SEP), Williams (WMB and WPZ), Kinder Morgan (KMI and KMP), Nisource (NI) and Tallgrass (TEP). We believe a portfolio of these stocks offers investors exposure to projects with high returns, volume growth and little commodity price exposure (only within these projects).

Figure 1. Company Comparison

Company	Ticker	Dividend/Distribution Yield		EV/EBITDA	
		2014	2015	2014	2015
Kinder Morgan Energy Partners LP	KMP	7.0%	7.3%	13.4x	12.4x
Kinder Morgan Inc	KMI	5.1%	5.5%	11.7x	11.4x
NiSource Inc	NI	2.9%	3.0%	10.8x	10.1x
Spectra Energy Corp	SE	3.6%	3.9%	12.5x	11.8x
Spectra Energy Partners L P	SEP	4.7%	5.0%	12.2x	11.4x
Tallgrass Energy Partners, LP	TEP	4.2%	4.8%	12.9x	12.8x
The Williams Companies Inc	WMB	4.3%	5.2%	13.5x	12.2x
Williams Partners LP	WPZ	7.3%	7.7%	13.7x	12.1x

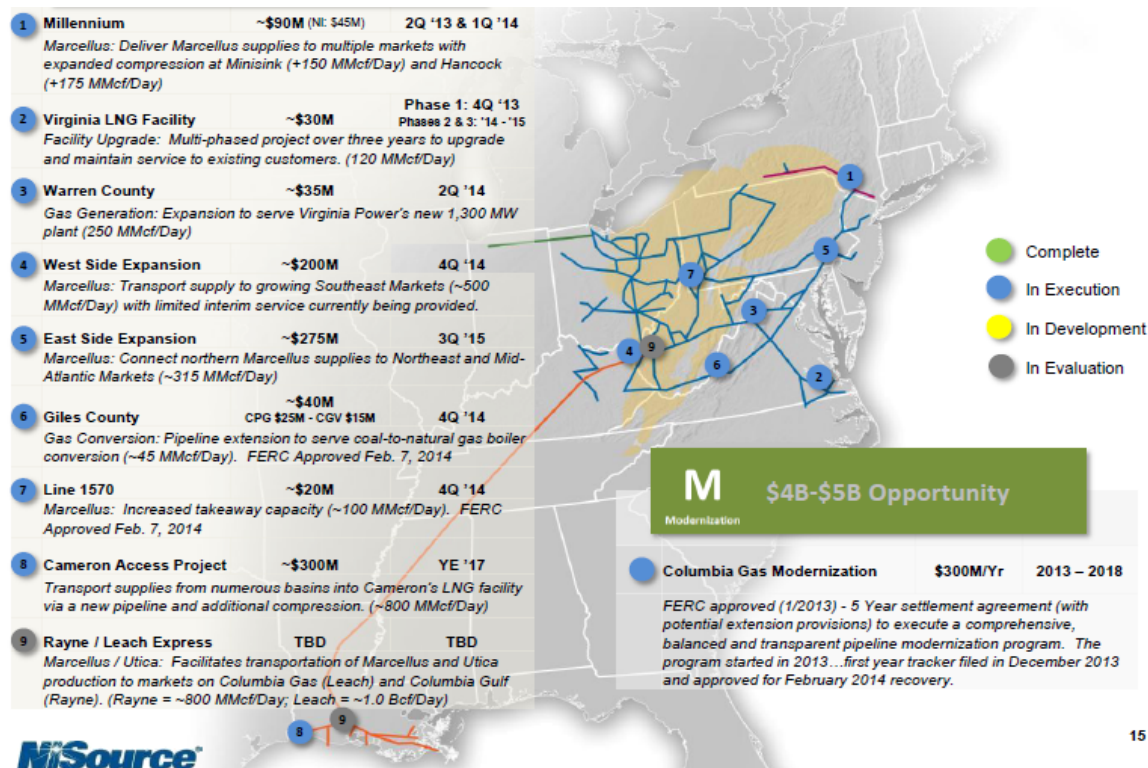
Source: Citi Research

Major Inter-Regional Pipeline Projects

NiSource

NiSource has announced three major Marcellus/Utica export projects. These projects are on top of a number of gathering and intra-regional pipeline expansions. All of the export projects fall under the company's Columbia Pipeline Group.

Figure 2. NI Major Marcellus Gas Pipeline Projects



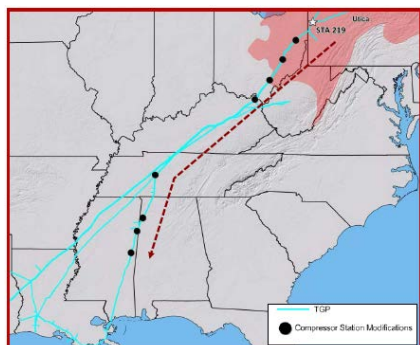
Source: Company presentation

- **West Side Expansion:** This \$200mn project will transport Marcellus volumes to the U.S. Southeast. Its target in-service date is 4Q14 with capacity of ~540 MMcf/d. The project will increase supply takeaway from the Waynesburg PA / Smithfield WV part of the Columbia Gas Transmission system. The first phase of the project, called the Gulf Bi-Direction Project, was completed in 2013. It provides backhaul transportation from Leach KY to Gulf Coast markets by modifying the Columbia Gulf Transmission system.
- **Cameron Access Project:** This \$300mn project will transport gas from numerous basins to Cameron's LNG facility in Hackberry LA via a new pipeline and compression stations. The planned capacity is ~800 MMcf/d and an in-service date of year-end 2017. Estimated transport rates are \$0.17 dth/d. Cameron LNG expects first LNG production in 2017 and full commercial operation in 2019.
- **Rayne / Leach Express:** This project aims to transport Marcellus and Utica volumes to Louisiana via Columbia Gas and Rayne via Columbia Gulf. We put the project cost at ~\$500mn. Expected capacity for the Rayne line is ~800 MMcf/d and ~1.0 Bcf/d for the Leach line. The non-binding open season documentation estimates transport rates for Leach between \$0.35 and \$0.55 and a start-up date as early as Nov. 1, 2016. For Rayne, the documentation estimates rates of \$0.12 to \$0.30 and the same start-up date. Open season for the project concluded on Jan. 10, 2014.

As Figure 1 shows, NI has several other Marcellus/Utica pipeline projects in the works. They are generally smaller scale than the projects we have highlighted above. Some, like the Millennium project, will deliver Marcellus supplies to markets outside of Appalachia (in Millennium's case, New York), while others, like Line 1570, will move volumes intra-regionally.

Kinder Morgan

Figure 3. Utica Backhaul Transport Project

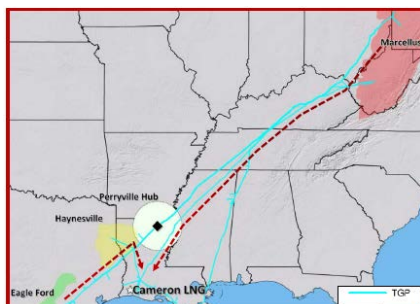


Source: Company presentation

Kinder Morgan has several projects planned for moving gas out of the Marcellus/Utica. These projects fall under the Tennessee Gas Pipeline Co. (TGP) and Natural Gas Pipeline Company of America (NGPL).

- **Utica Backhaul Transportation:** Kinder plans to modify the TGP system to bring Marcellus and Utica production to multiple delivery points on the Gulf Coast. The incremental north to south capacity gain would total 500 MMcf/d (400MMcf/d long term, 100 short term). The project involves pipe modifications at 8 compressor stations and has a price tag of \$155mn. The open season closed in Dec. 2013 and the line is currently under construction. The estimated in-service date is Apr. 2014.
- **Rose Lake Project:** This project aims to add ~230 MMcf/d of firm capacity along the company's 300 Line in northeastern PA. The goal is to expand TGP's capacity to transport Marcellus gas to Canada and New England. The project requires new compression facilities. Capital costs are estimated at \$83mn. Construction began in Apr. 2014. It is estimated in-service in Nov. 2014.
- **Niagara Expansion:** This project will provide additional access for Marcellus gas to eastern Canadian markets. It will transport volumes from northern PA to the Niagara NY area. The 158 MMcf/d expansion is estimated to cost \$26mn. It has an estimated in service date of Nov. 2015. FERC filing is expected this month.
- **Cameron LNG:** This \$138mn project will allow for 900 MMcf/d of capacity to flow from the Marcellus to the Gulf Coast. It requires compressor station modifications to accommodate bi-directional flow, pipeline laterals in the Perryville LA hub, and additional compression. TGP plans to file its final EIS with FERC in Apr. 2014 and expects FERC approval and non-FTA approval in Jul. 2014.
- **NGPL:** NGPL just announced the launch of a 14-day open season to gauge interest in expanding its Gulf Coast mainline system. The move would allow the company to flow up to 750 MMcf/d of gas from the Rockies Express (REX) south to markets along the TX and LA Gulf Coast. The expansion would require the reversal of compressor stations and other changes.

Figure 4. Cameron LNG Project



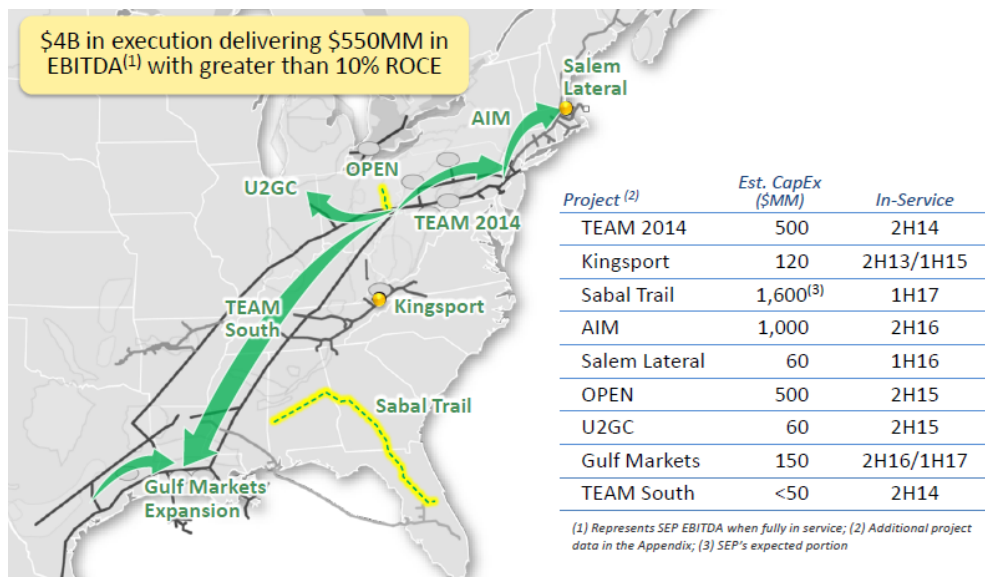
Source: Company presentation

Spectra

Spectra has two major projects underway involving Marcellus and Utica gas.

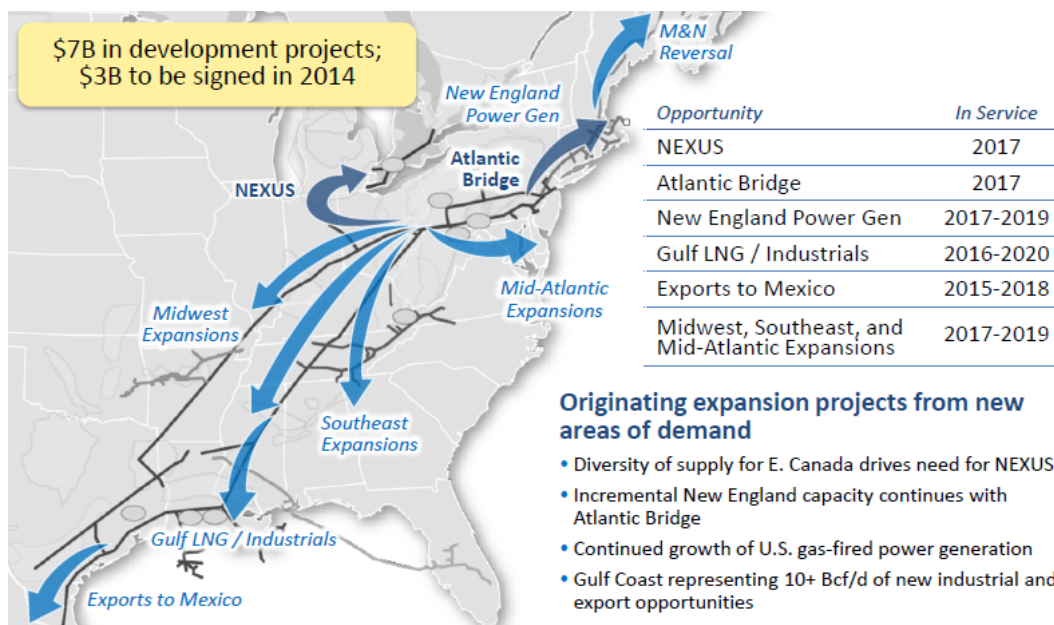
- **Texas Eastern Appalachia to Market 2014 (TEAM 2014):** This project will provide bidirectional flow and 600 MMcf/d of additional transportation capacity from the Appalachia region to the Northeast, Midwest, Southeast, and Gulf Coast. FERC green lighted the \$520mn project this week. Spectra expects an in-service date of Nov. 2014.

Figure 5. Spectra Gas Transmission Projects Being Executed



Source: Company filings

Figure 6. Spectra Gas Transmission Projects Under Development



Source: Company filings

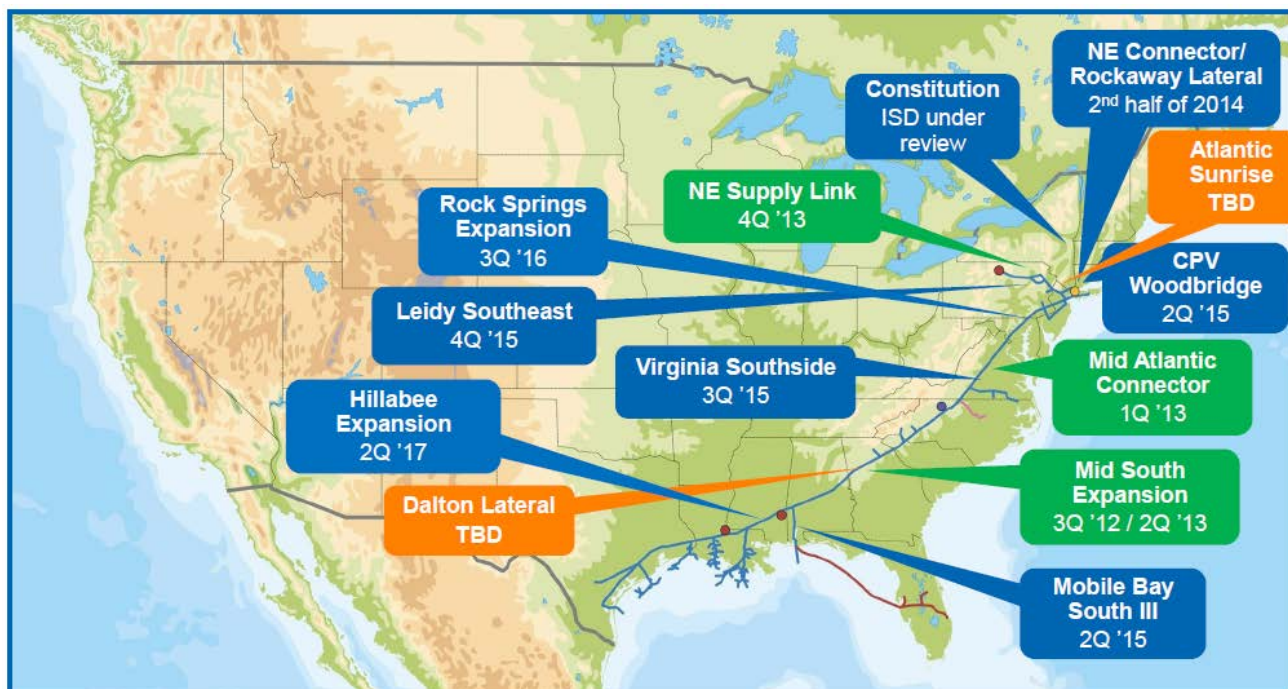
- Ohio Pipeline Energy Network (OPEN): This project is designed to move Utica and Marcellus gas to markets in the Midwest, Southwest, and Gulf Coast. The gas will move via the mainline extension in Ohio and the existing TX Eastern system in western PA to delivery points in Louisiana. It will add incremental capacity of 550 MMcf/d. The cost is estimated at \$500mn. A formal application was submitted to FERC in Jan. 2014. The project is expected to be in service in 4Q15.
- NEXUS: This project is a Greenfield line that will bring gas from the Utica in northeastern OH to Michigan and utilize the Vector pipeline system to reach

eastern Canada. It has a planned capacity of 1 Bcf/d and a cost of ~\$1.2 - \$1.5bn. It has an in-service date of 2017. As it stands, the project is still being evaluated and no final investment decision has been made. DTE Energy and Enbridge are partners on the project.

Williams Companies

Williams has announced two major projects that will move gas out of the Marcellus: Transco Leidy Southeast and Atlantic Sunrise.

Figure 7. Williams Atlantic-Gulf Pipeline Projects (Recently Completed and Announced)



Source: Citi Research

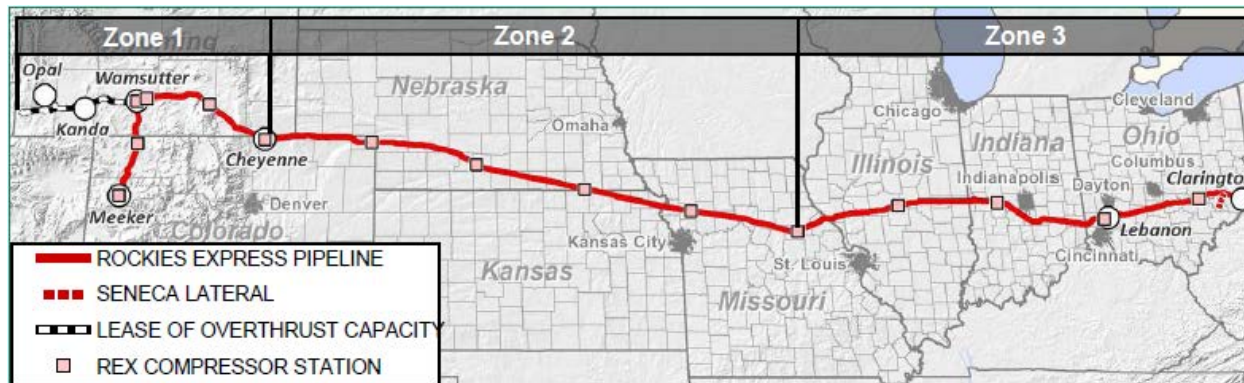
- **Leidy Southeast Expansion:** This project will increase Transco's capacity by 525 MMcf/d. It involves the construction of ~30mi of additional loops and some modifications to existing compressors and valves. In its open season last year, the company booked the full capacity of the line. Williams filed a FERC permit in Sep. 2013. Construction is slated to begin this fall. In-service is expected in Dec. 2015.
- **Atlantic Sunrise:** This project will make the Transco mainline bi-directional from the Marcellus in PA to southwestern AL. It involves pipeline looping, compressor additions, and modifications to Transco's mainline. The company stated in an open season that it could provide Marcellus producers with between ~450 MMcf/d and +1 Bcf/d of firm transportation. Atlantic Sunrise is fully contracted at 1.7 Bcf/d for 15 years. Cost is estimated at \$2.1bn.

Tallgrass Energy Rockies Express (REX)

REX is a joint venture among Tallgrass Development, Sempra, and Phillips 66. The company is exploring ways to bring Utica and Marcellus gas westbound on its system to MO, which currently moves Rocky Mountain gas as far eastward as OH. Initial contracts have been signed to begin flowing gas east to west in 2014. The company received permission from FERC to offer lower rates to westward shippers

than are currently offered to eastward shippers. The line has a capacity of 1.8 Bcf/d. Tallgrass is awaiting regulatory approval for the project.

Figure 8. Rockies Express Pipeline



Source: Company presentation

Kinder Morgan Inc (KMI.N; US\$33.15; 1); Kinder Morgan Energy Partners LP (KMP.N; US\$78.32; 2); NiSource Inc (NI.N; US\$35.40; 2); Spectra Energy Corp (SE.N; US\$37.12; 2); Spectra Energy Partners L P (SEP.N; US\$47.76; 2); Tallgrass Energy Partners, LP (TEP.N; US\$28.57; 2); The Williams Companies Inc (WMB.N; US\$40.50; 1); Williams Partners LP (WPZ.N; US\$49.53; 1)

Commodity Research View

Constrained Marcellus: The New Prometheus

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Just as Prometheus in Greek mythology gave fire to humanity, the Marcellus ignited US production growth after the stagnation of other shale plays. The region almost single-handedly drove national production growth in the last couple of years. However, just as the success of Prometheus led to his punishment by having him bounded to a rock and unable to escape, the Marcellus, along with the addition of Utica, could be the victim of its own success. Without sufficient regional export pipe capacity, Marcellus and Utica gas production growth should slow substantially, keeping gas tied to its source rock. Hercules ultimately freed Prometheus but will Marcellus/Utica have its own Hercules to unlock its potential?

Introduction

A cold winter has helped ease the expected production glut in the US Northeast in 2014, but more trouble lies ahead. Citi expects Dominion South Point prices, representative of southwest Marcellus and Utica, to be \$0.7 below Henry Hub in Q2'14 and \$0.8 below in all of 2014. Transco Leidy prices, representative of northeast Marcellus, could be \$2.0 below Henry Hub in Q2 and \$2.2 below in all of 2014.

Figure 9. Forecasts of Northeast gas basis to Henry Hub*

Differential to Henry Hub (\$/MMBtu)	1Q'14	2Q'14	3Q'14	4Q'14	1Q'15	2Q'15	3Q'15	4Q'15	2014	2015	2016	2017	2018
Dominion South Point (SE Marcellus/Utica)	-0.3	-0.7	-1.1	-0.9	-0.7	-1.0	-1.5	-0.8	-0.8	-1.0	-1.0	-1.0	-1.0
Transco Leidy (Northeast Marcellus)	-2.4	-2.0	-2.4	-2.0	-2.3	-2.0	-2.0	-2.0	-2.2	-2.1	-2.0	-2.0	-2.0

Source: Citi Research.

But continued production growth in 2015 without a commensurate increase in demand and gas pipeline export capacity to absorb this production growth should bring back depressed levels of prices. Very strong demand in the 2013-14 winter depleted gas inventories in the region by close to 200-Bcf vs. the prior year. Thus, refilling regional storage fields should help alleviate the production glut in 2014. But there is also limited scope for demand growth in 2015 and beyond even with coal retirements, especially with nearly flat weather-normalized electricity demand growth, so more pipeline export capacity would be needed.

Hence, more "import" pipelines that historically brought gas to the Northeast would have to be reversed and expanded to accommodate future production growth. But the process could take longer than expected. Although more reversals could happen at existing import pipes, there are bottlenecks outside of the Northeast as well. For example, taking gas to the Chicago market should displace gas from the Rockies, Canada and the Gulf Coast, but contracts could limit how much more gas from these regions could be displaced.

More broadly, these infrastructure constraints could push long-dated NYMEX prices higher due to severe regional supply-demand imbalances between now and 2020. To meet substantial gas demand and export growth mostly on the Gulf Coast, the market has long expected the Northeast to supply much of the production needed. But constraints could make this difficult, forcing the market to rely more on higher-cost Gulf Coast gas. Although higher NYMEX prices may not lift northeast prices on a 1-to-1 basis, higher regional prices, despite the discount to Henry, should still be welcome by Northeast producers. For example, a \$2 discount to \$5.5/MMBtu Henry Hub gas is preferable to a \$1.5 discount to \$4 Henry Hub gas.

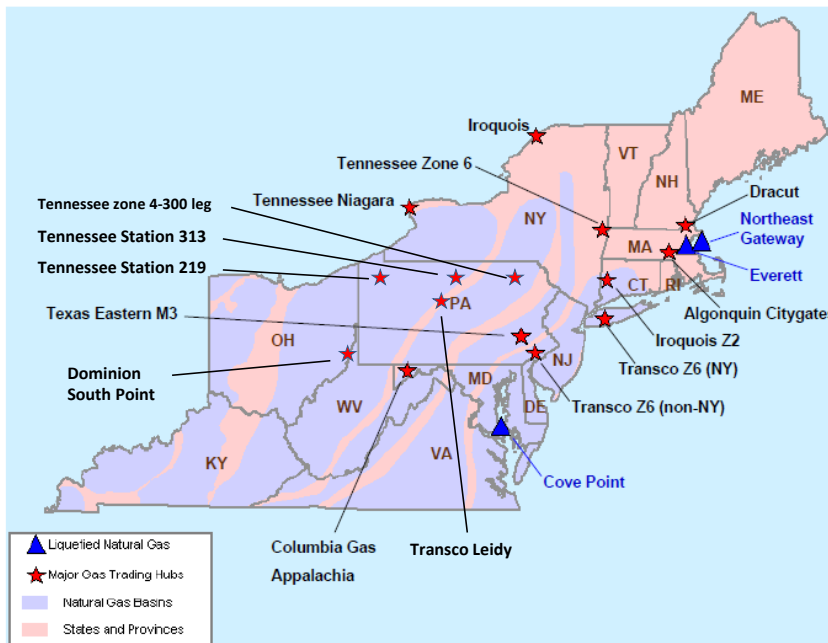
The rest of the report examines the following: (1) Historical and projected production, highlighting the impact of infrastructure constraints; (2) short term and

long term demand trajectories; (3) the future of regional storage; (4) a review of pipe reversal and new builds proposals; and (5) what these all mean to regional prices.

1. Production: Marcellus/Utica growth transformational for the region and country

The energy transformation that is about to turn North America into a net natural gas and eventually petroleum exporter is already affecting the Northeastern part of the US. **Historically a major gas-consumption region, very strong production growth would have put annual average production above annual average demand this year, turning the region into a net gas exporter.** A very cold winter and strong demand pushed this out to 2015. To put the size of Northeast production into perspective, output rose from miniscule levels less than a decade ago to one-fifth of US gas production now, surpassing Norway and China and approaching Qatar's and Iran's 15 Bcf/d level.

Figure 10. Map of price points in the Northeast¹



Source: FERC, Platts, Citi Research

However, exporting gas out of the Northeast nation-wide would unlikely be a smooth process: production tends to rise more gradually but pipe capacity additions often come in discrete chunks. This causes the size of the emerging production glut (and regional pricing) to fluctuate seasonally, unless there will be vastly more pipe space than production.

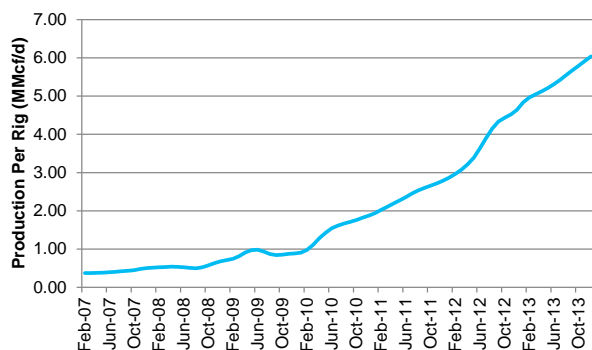
Historical and projected production growth

Rapid Northeast production growth has demonstrated the prolific-nature and efficiencies of shale gas plays. As a measure of efficiency gains, new Marcellus

¹ Locations marked only represent the approximate area, as price points typically pool gas flows and transactions in the general area. For details of precise definition of price points, please refer to Platt's methodology:
http://www.platts.com/IM/Platts.Content/methodologyreferences/methodologyspecs/na_gas_methodology.pdf

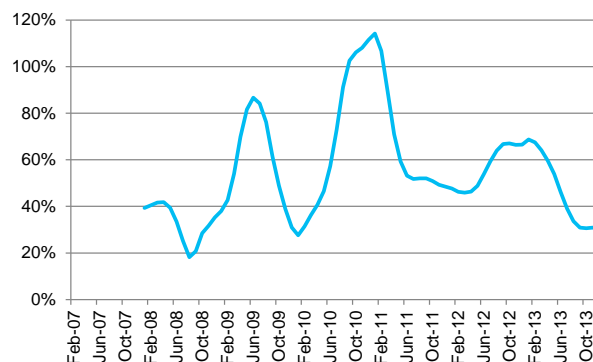
well-head wet gas monthly production per rig has surged 16-fold in 7 years, for a growth rate of ~50%pa. Some wells in northeast Marcellus have initial production rates that are multiples higher than the average in the region. (See the [“US Oil and Gas Drilling Productivity Report”](#) for details) Such high efficiency gains help to sustain gas production growth despite low rig counts: production in the Northeast rose from ~1.6 Bcf/d in 2009 to ~13.1 Bcf/d in Dec 2013.

Figure 11. Average first month gas production per rig surged 15 fold in Marcellus in the past 7 years (2007-2013)



Source: EIA, Citi Research

Figure 12. Leading to continued productivity gains (%/y change in “production per rig”) every year

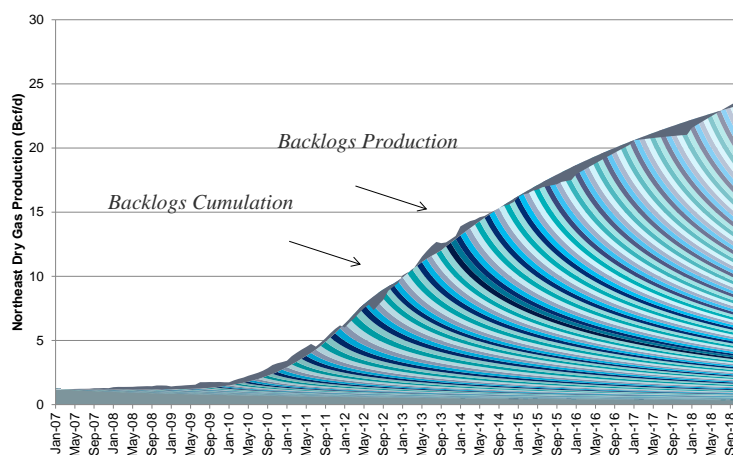


Source: Citi Research

Besides efficiency gains, the clearing of more well backlogs has also increased gas production, but cold weather and subsequent well freeze-offs have capped production from rising further for now.

Note that the unconstrained production growth is modeled for this analysis, which means that we do not expect prices to fall below \$2/MMBtu for a prolonged period of time. But this also means that production growth (Marcellus + Utica) would have to slow down substantially to about 2-Bcf/d per year from now to 2018 vs. the prior two years, when production grew by about 3 to 4-Bcf/d per year.

Figure 13. Historical and Predicted Northeast Dry Gas Production in Marcellus (2007 – 2018)



Source: EIA, Bentek, Citi Research

What was previously considered a temporary dislocation, when regional gas prices fell to \$2 or below, could simply be a preview of something more structural for years to come. Pipeline bottlenecks in 2Q and 3Q'13, amid low demand but strong production growth, prompted producers to curtail production. New backlogs of wells could potentially be added during this period as well. New pipelines that came online in Nov'13 helped to debottleneck the region, allowing curtailed production to come to market. But there is a constant need for more export pipe capacity. The question is whether pipe capacity can keep pace with production.

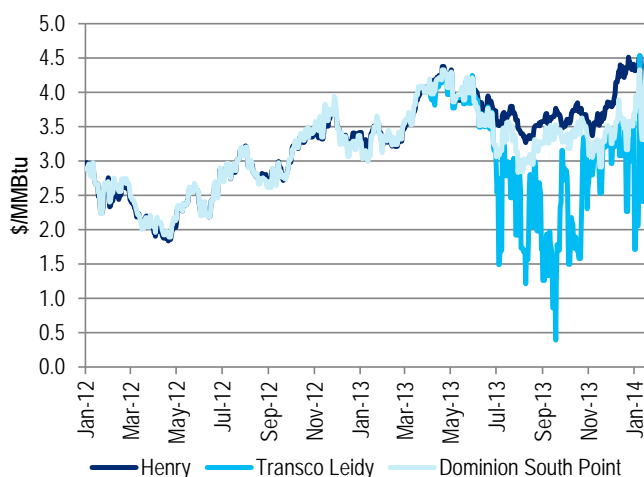
There have already been several cases of pipeline capacity constraints leading to production gluts and sharp price declines. A recent example is the bottleneck on the TETCO mainline in NJ. In 3Q'13, pipe capacity limits restricted Marcellus gas flow to southeastern PA, NY and NJ, thereby confining new gas within the Marcellus production region and pushing Transco Leidy prices down to below \$2/MMBtu. Such large negative cash basis vs. Henry Hub and low flat price likely led producers to curtail production. The low-price period last year went from August to October before several new pipes began to ramp up, including Transco Northeast PA pipeline between Leidy and Centerville (+250-MMcf/d), upgrades at TGP Leidy to Mahwah pipeline (+636-MMcf/d) and TETCO Mahwah to NJ-NY pipelines (+800MMcf/d).

[illegible]

In the future, given the pace of pipeline additions and the pattern that they mostly come in Q4, Q3 should be the quarter with the lowest average price in a year. Should regional flat prices hover around the \$2 mark or below for a sustained period of time, to the point of cutting into marginal production costs, producers are expected to slow drilling activities and curtail existing production.

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Figure 15. Marcellus area prices (e.g. Transco Leidy and Dominion South Point) fell in mid-2013 as production rose and hit pipe constraints until new pipes entered service in Nov



Source: Platts, Citi Research

2. Demand: short-term strength but long-term disappointment

Short-term demand (2014)

A cold winter helped ease the expected gas production glut in 2014 in the US Northeast. Very cold weather lingered in the Northeast and Midwest, driving residential and commercial gas demand higher by about 1.8 Bcf/d year-on-year to 14.8 Bcf/d. The average January Heating Demand Days (HDDs) for major cities² in Northeast region added up to 1107, 23% higher than the same period 2013, and 12% higher than trailing 5-year average.

With higher than normal gas demand this winter drawing down gas inventories, the need to refill regional storage should partially absorb the expected production growth. Refilling storage could require an additional 0.75-Bcf/d in injections y/y in the next two quarters, which should help absorb production growth in the Marcellus and Utica this year.

In addition, although Henry Hub prices look to stay high, low forward Northeast gas prices should keep gas-fired generation competitive vs. coal and gas demand elevated.

Long term demand trajectory

Could Northeast demand growth alone absorb 2-Bcf/d per year in long term production growth from the Marcellus and Utica? It is a big stretch. Even if demand were to grow at 1-Bcf/d, in five years the cumulative growth would amount to about one-quarter of current industrial demand. This still seems too large. Although long term demand growth nationally is expected to be strong, LNG exports, exports of pipe gas to Mexico and industrial growth are mostly happening on the Gulf Coast, not the Northeast. See Citi's report "[The New American \(Gas\) Century](#)" (Jan'14) for a detailed examination of the future of US gas.

² Temperature is calculated as the average of Philadelphia, Boston, New York and Washington DC

Demand growth trajectories in each of the sectors are outlined below. Although it is true that new intra-regional pipelines have been planned or proposed, which could boost regional demand, these projects could not provide sustained growth far into the future. These projects include Transco's new 0.65-Bcf/d Rockaway delivery lateral delivering gas to the New York area, and Spectra's 0.35-Bcf/d AIM project expanding the deliverability of the Algonquin pipeline – a backbone of the New England gas system. But these intra-regional pipes are one-time additions and may only reach full capacity during winter, as there is little demand in other seasons, especially from the Residential and Commercial sector.

The following outlines our views on demand growth but not accounting for demand gains coming from Transco's Rockaway Lateral in New York and Spectra's AIM in New England.

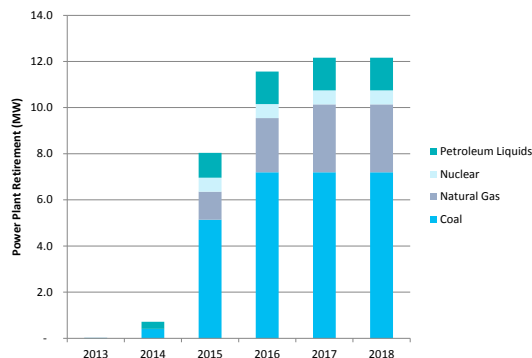
Power generation: In the next few years, coal-fired generation retirement due to strict emission rules should give a short term boost to baseload gas demand in 2015. But weak to negative electricity demand growth and the increased penetration of renewables could begin taking the generation market share away from gas post-2016. In all, we expect gas demand in power generation to increase by more than 0.5 Bcf/d from 2013 to 2018.

Figure 16. Weather-normalized electricity demand growth has been flat to negative, potentially limiting gas burn for power generation



Source: ISOs, Citi Research

Figure 17. Northeast coal power plant retirements to give a short term boost to gas demand, as gas plants substitute retiring coal plants

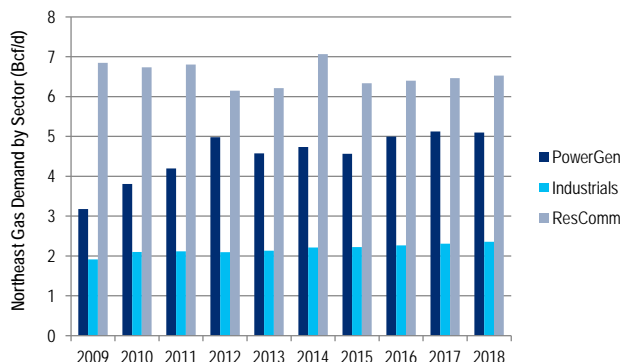


Source: Company reports, Citi Research

Industrials: Long-run industrial gas demand growth is expected to be small in the Northeast, as many planned projects are on the Gulf Coast or elsewhere in the country. Citi expects 0.3-Bcf/d of Northeast demand growth between now and 2018 from a base of 2.1-Bcf/d currently. There is potential for more demand growth

Residential and commercial: Between now and 2018, gas demand in the residential/commercial sector is expected to rise by 0.3 Bcf/d, reaching 6.5 Bcf/d in 2018, although demand is highly sensitive to winter weather conditions.

Figure 18. Northeast Gas Demand by Sectors (2009-2018)



Source: EIA, Citi Research

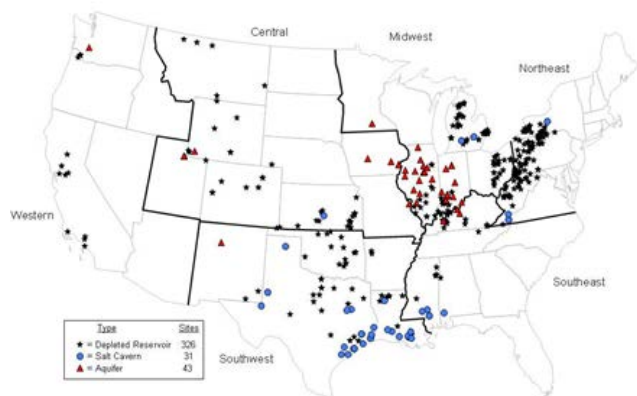
With weak demand growth, regional production could soon exceed regional demand on an annual basis, leaving the vast expansion of export pipe capacity as the most effective option to relieve an expected production glut.

As indicated above, incremental gas demand should be elevated in 2014 before falling back to more normal levels in 2015, assuming more normal winters. Thus, reversing pipelines and exporting gas out-of-region would be a more optimal option to relieve the production glut and allow production growth to continue in a more robust manner.

3. The future of regional gas storage

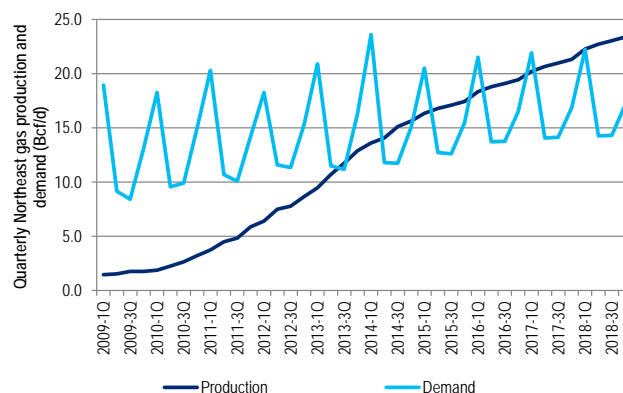
Besides reversals of pipeline flows, the importance of storage could diminish over time. The value of storage fields in the Northeast derives from their ability to deliver gas amid periods of volatile but very high demand. In the past 10 years, winter gas consumption (Dec to Mar) made up nearly 50% of annual demand. Close to 40% of annual demand takes place in Q1, two times more than gas demand in Q3. But as gas production levels come close to meeting peak demand, along with further development in intra- and inter-regional infrastructure, the demand for gas storage could fall. Other than reliability factors and how storage gas could serve as peak-shaving supply, there could be an oversupply of storage fields. Nonetheless, given how low the tariffs are at some of these fields, gas stored in the Northeast outside of winter could be exported out of the region during winter, much like how EIA's "Producing region" operates these days, supplying Gulf Coast gas to the rest of the country.

Figure 19. Underground Natural Gas Storage Facilities (2007)



Source: EIA

Figure 20. With production rapidly approaching even peak demand levels, the need for gas storage to balance the market could diminish

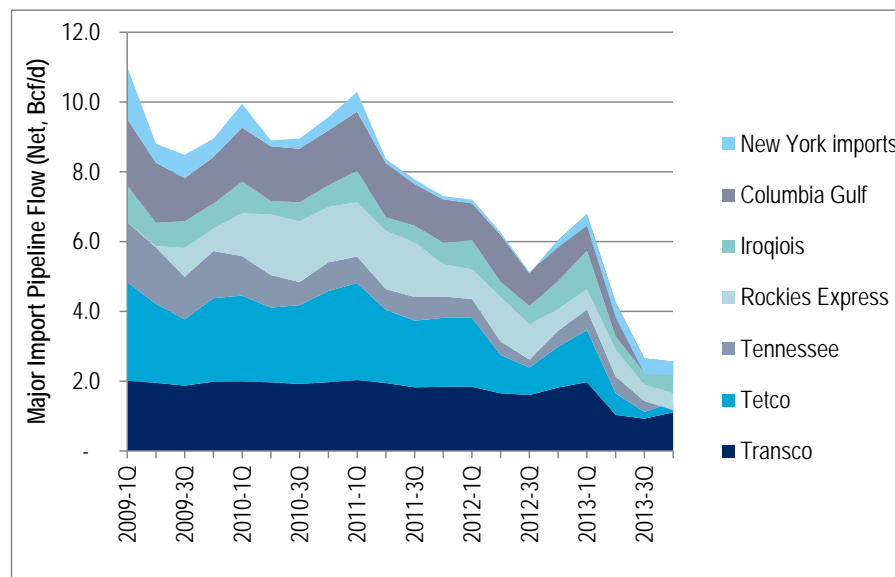


Source: EIA, Citi Research

4. Pipeline infrastructure: planned changes looks insufficient to relieve the long term glut

With rapid production growth pushing production above regional demand, gas exports out of the region are becoming an urgent issue. The Northeast region has historically imported as much as 12 Bcf/d of gas from the Gulf Coast, Canada, Rockies and LNG even going as far back as 2009. To see how much pipeline gas export capacity is needed, the requirement for pipe reversals can be calculated by subtracting net injection and demand requirements from total production, after accounting for legacy gas imports, such as gas supply to New England and parts of the East Coast.

Figure 21. Major inter-states pipeline flows into the Northeast

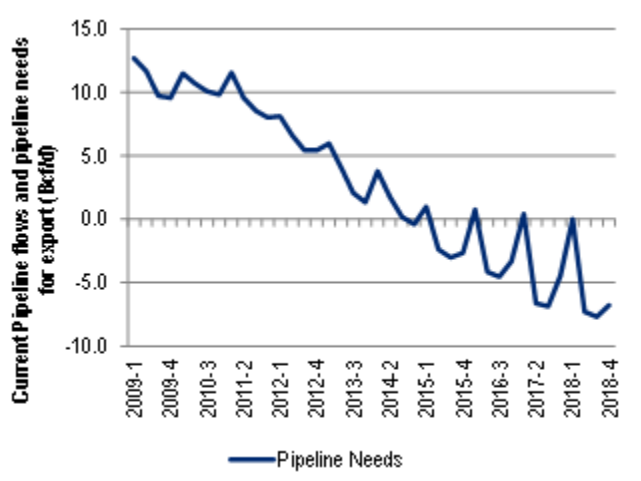


Source: Bentek, Citi Research

Current plans to reverse some pipes for exports appear insufficient to relieve the growing production glut, unless more pipe reversals take place or production growth slows sharply. Major reversal projects include:

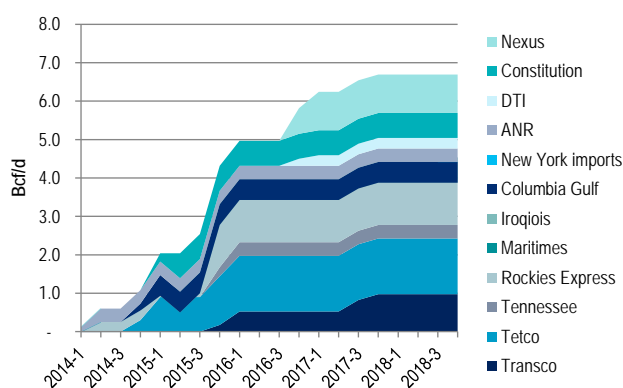
Rockies Express (REX): REX ships Rockies gas east to Ohio and Pennsylvania. Historically, it delivered around 1.8-Bcf/d of gas to Ohio, but the volume has declined to around 470-MMcf/d as of 2013. In light of strong Northeast production growth, a backhaul project is scheduled to start operating as soon as 2Q'14, providing 250-MMcf/d delivery capacity across REX zone 3 from Clarington, OH to Missouri, and possibly displacing north-bounded flow on NGPL that serves the Chicago market. Plans are also underway to fully reverse REX with an additional 1.5 Bcf/d in capacity in Zone 3. Some have initially cast doubt on this second project due to the "Most Favorable Nations" clause with REX and anchor shippers. However, a FERC ruling seems to suggest the possibility of waiving the clause in potential west-bounded gas flows. This 1.5 Bcf/d backhaul capacity could come online in late 2015.

Figure 22. Pipeline needs for imports and export (2009-18) – positive means imports needed; negative means exports needed



Source: EIA, Citi Research

Figure 23. Export pipe capacity (planned and under construction)



Source: Company reports, Bentek, Citi Research

ANR Lebanon Lateral: TransCanada has filed to modify the ANR system between Glen Karn to the ANR southeast mainline between Indiana and Ohio. The expansion would ship Dominion South Point gas west to Detroit and elsewhere, displacing gulf gas and supplying gas to Michigan. The project is expected to be completed by 2Q'14 with 350-MMcf/d of capacity.

Transcontinental Gas Pipeline (Transco): Transco takes Gulf Coast gas historically and delivers gas to end users along the East Coast, particularly the Northeast. It also has a western leg to regional supply pipelines in Leidy. In the past year, the Appalachian production growth has generated a large glut in the Leidy supply link, but 12 miles of new pipeline came online last November adding 250 MMcf/d of capacity along the route. Similar to Texas Eastern (TETCO), Transco's Leidy Southeast reversal project should be completed by late 2015, adding an additional 525 MMcf/d of capacity to the mainline and delivering gas to zones 4, 5 and 6 and to Alabama. Although Transco's 270-MMcf/d Virginia Southside project is expected to come online some years later, this capacity may not be additive to other planned export capacity. Moreover, Transco has also announced plans for the Atlantic Sunrise project – a backhaul expansion project that could add 450MMcf/d in

southbound export capacity to Zone 4 initially but could reach 1Bcf/d later on. The final capacity could be determined subject to responses during open seasons. The Atlantic Sunrise project is expected to come online in 2Q/3Q'17.

Texas Eastern (TETCO): TETCO mainlines transport Gulf Coast gas to New England and Mid-Atlantic markets. Multiple production linkage/backhaul projects have been announced to release the production glut in the Northeast including: (1) TETCO Team 2014 is a supply-link project which could come online in 2H'14. The project is associated with piping and valve modification to increase bi-directional capacity. But the southbound capacity could be limited given that much of the expansion is located within the Northeast. It is possible that only a small portion of the nameplate capacity is truly backhaul/exportable capacity. (2) The south expansion project is a 300-MMcf/d bi-directional expansion on TETCO's south mainline, which could be in service in 2H'14. (3) The OPEN project is a 550-MMcf/d supply-link project that could be in service by Nov'15. Different from Team 2014, the project ships Northeast gas to the Gulf Coast. Compressor modifications associated with the project could add 550-MMcf/d in bi-directional capacity. (4) The Gulf market expansion project is expected to add 350-MMcf/d in southbound capacity to south mainline and could begin operation in 2H'16/1H'17.

Tennessee gas pipeline (TGP): TGP mainline takes a similar route as TETCO, shipping gas from the Gulf Coast to New York and New England. Several expansion projects have helped to relieve the production glut: a 636 MMcf/d project adding to delivery from Marcellus to Mahwah; a 240 MMcf/d expansion at MPP delivering gas to NY/NJ. But exports may not start until 2H'15 when a Utica backhaul project adds 350-MMcf/d of pipe capacity taking gas out of the Northeast

Figure 24. Selected Northeast backhaul projects (2014-2016)

Project Name	Est. Start Date	Capacity (MMcf/d)	Status	Backhaul/Export Capacity?
REX backhaul	4/1/2014	250	Under Construction	Yes
AGT - Incremental Market Project (AIM)	1/1/2016	342	Proposed	
ANR - Lebanon Lateral	3/1/2014	350	Planned	Yes
Transco - Leidy Southeast	12/1/2015	525	Proposed	Yes
TGP - Utica Backhaul Transportation	11/1/2015	352	Planned	Yes
DTI Iroquois Project	11/1/2016	275	Planned	
Transco Rockaway Delivery Lateral	11/1/2014	647	Proposed	
Constitution Pipeline	3/1/2015	650	Proposed	
NiSource West Side Expansion Project	12/1/2014	540	Planned	Yes
TETCO OPEN Project	11/1/2015	550	Proposed	Yes
Nexus Pipeline	11/1/2016	1,000	Planned	Yes
REX backhaul	9/1/2015	1500	Planned	Yes
TETCO Team 2014	11/1/2014	600	planned	Yes
TETCO South Expansion	11/1/2014	300	planned	Yes
Transco Atlantic Sunrise	7/1/2017	450	planned	Yes

Possible backhaul/export capacity

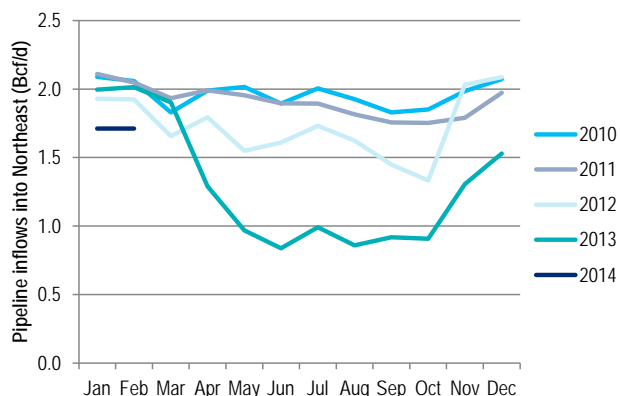
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Source: Company reports, Bentek, Citi Research

Columbia Gulf Transmission and NiSource West side Expansion: The Columbia Gulf pipeline takes gas from Gulf Coast to Kentucky and the broader Columbia Gas pipeline system. The Columbia Gas pipeline system distributes gas to Mid-Atlantic states, including West Virginia, Ohio, Pennsylvania and etc. In the past 2 years, gas flows have already dropped from ~2-Bcf/d in winter to ~0.4-Bcf/d last December. The plan to reverse flows has been filed, with Smithfield III project linking Leach to receipt points in Washington and modifying the mainline into a bi-directional pipe. The modified capacity is expected to reach 540-MMcf/d.

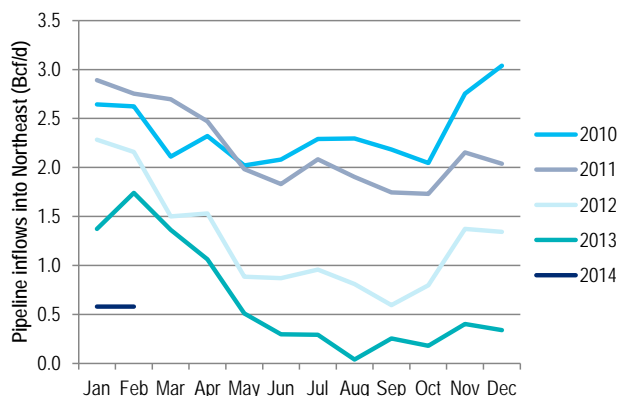
Nexus Project: Nexus project is designed to deliver gas from Marcellus and Utica to Midwest and eastern Canada. These markets have high demand from LDCs, power utilities and Industrial users. The capacity could reach 1-Bcf/d. The project is planned to be in service in 2017.

Figure 25. Historical Transco inflows into the Northeast



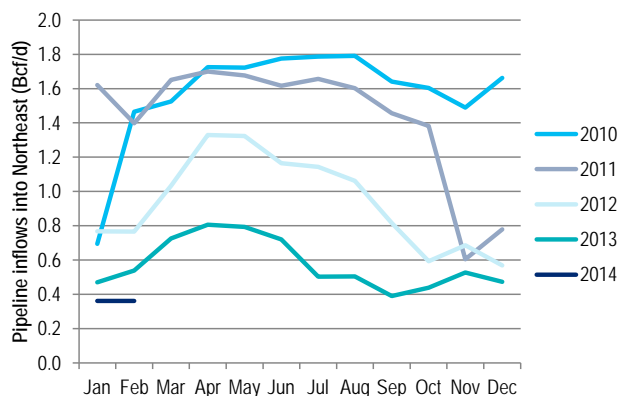
Source: Bentek, Citi Research

Figure 26. Historical TETCO inflows into the Northeast



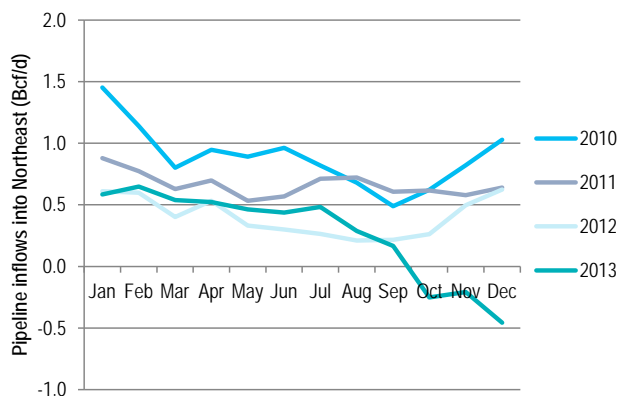
Source: Bentek, Citi Research

Figure 27. Historical REX inflows into the Northeast



Source: Bentek, Citi Research

Figure 28. Historical TGP inflows into the Northeast

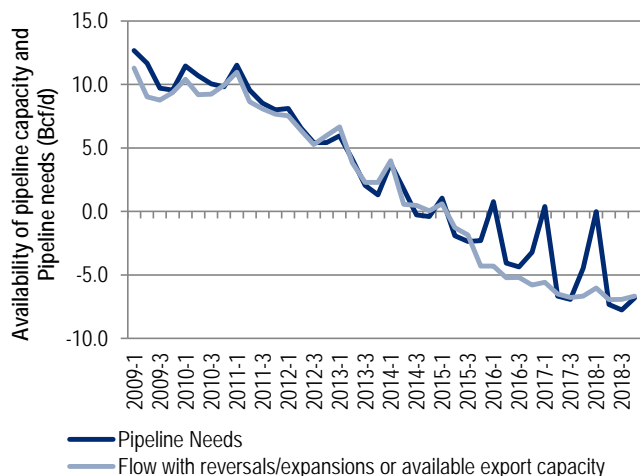


Source: Bentek, Citi Research

Besides reversals of existing pipelines and building new export pipes, other new intra-regional pipelines have been planned or proposed, including a new Rockaway delivery lateral proposed by Transco. These intra-regional pipes should help raise regional demand.

In total, export capacity may reach to 6-Bcf/d by the end of 2016. But all of these pipelines have to run at 100% utilization and they will be barely enough in 2017. If they run at 80% utilization, then production and the need for exports would far exceed available pipe capacity.

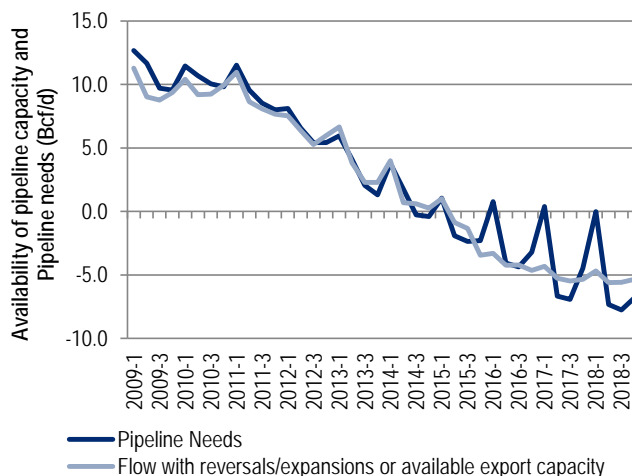
Figure 29. At 100% utilization, all currently planned reversal and expansion projects should be enough to alleviate the production glut by late 2015, but production growth would slow to ~2-Bcf/d between now and 2018



Source: Company reports, Citi Research

The blue line represents the demand for pipeline gas or "pipeline needs" (positive = imports, negative exports); the gray line represents actual pipe flow before Q1'2014 and expected net export pipeline capacity after Q1'2014.

Figure 30. But at 80% utilization, these planned reversal and expansion projects would be barely enough to accommodate already reduced production growth in 2016 but not after

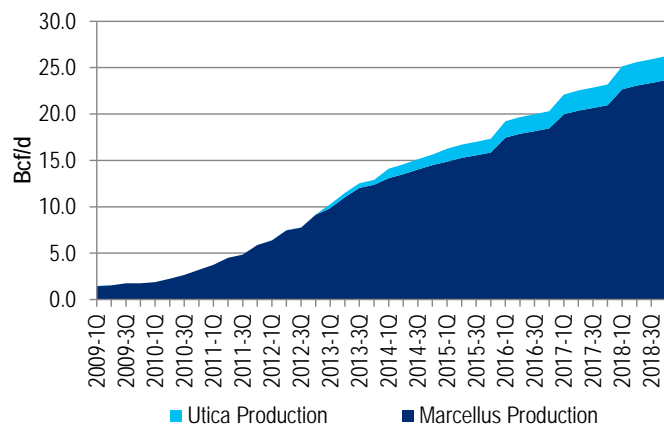


Source: Company reports, Citi Research

Looking back, production growth appears to have outperformed expectations and inadequate consideration was given to the broader gas supply environment that pipe reversal projects are far from sufficient so far. It seems that some producers were late in the game and only recognized the severity of the production glut and the resulting impact on prices. This might explain the delay in getting sufficient out-of-region pipeline takeaway capacity in place: a number of pipes would only become available in late 2015, coinciding with the 1 to 2 years needed in the pipeline permitting, reversal and construction cycle.

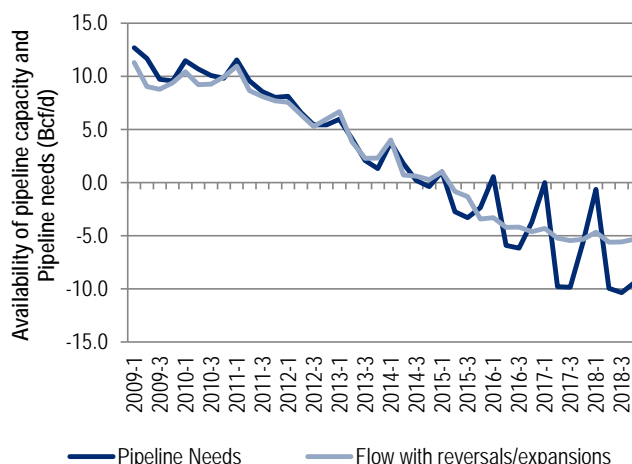
Going forward, even if production were to grow at the previous rate of 3-Bcf/d per year (or 75% of the y/y growth rate in 2013), a severe production glut could reemerge in 2015. In this scenario, all current and planned pipelines would have to operate at 100% capacity utilization even in 2016. Other than increasing backhaul capacity further by turning around all existing pipelines, adding compression and expanding the total capacity of existing pipelines are ways to increase export capacity. But there is only so much compression that can be added because of the technical pressure limit of steel pipes. Expanding the total pipeline capacity, even along the same route as existing pipes, could involve various processes, including land acquisition, environmental impact assessments, as well as local, state and federal approvals. Further, rising costs of skilled labor, particularly for welding just as many other industrial expansions would be occurring at the same time, could contribute to delays and cost increases. These factors could become longer-term barriers in adding export capacity for Northeast region.

Figure 31. If Northeast production were to grow at 3-Bcf/d per year from now to 2018...



Source: Citi Research

Figure 32. ...Even at 100% capacity utilization, all pipe reversals and export-related expansions would be insufficient to contain the glut



Source: Citi Research

5. Prices: New regional dynamics

Other than seasonal effects, pricing could evolve in three stages for two regional markers: Dominion South Point (DOMSP) representative of southwest Marcellus and Utica, and Transco Leidy (Transco Leidy) for Northeast Marcellus. It is also telling how Transco Leidy prices fell to \$2.2 for some period of time this winter even with the cold weather, so prices in spring could be discounted more consistently without weather-related demand.

First stage 2014: A cold 2013-14 winter and the need to refill storage should ease some of the downward pressure on gas prices in the Marcellus/Utica regions. However, since the supply glut is not completely eliminated and the transport cost of taking gas from the Northeast down south is in the vicinity of 80c/MMBtu or higher, DOMSP prices in Q2 and Q3'14 could be ~\$0.9/MMBtu below Henry. Further in the Northeast, there are fewer outlets for the gas produced and it is also where the glut is the most severe. Transco Leidy prices in Q2 and Q3'14 could be an additional ~\$1.3/MMBtu lower than DOMSP. The supply glut typically worsens toward late summer into fall, as demand generally weakens in fall. Hence, prices could be dragged down further, as production continues to rise but new pipes generally won't come online until Q4.

Second stage 2015: Assuming normal weather next winter and continued production growth, the increase in "export" pipe capacity does not appear enough to absorb production growth until late 2015. Without more new pipe capacity, basis widens further year-on-year until Q4, when we expect the full reversal of Rockies Express to greatly alleviate the glut there.

Hence, pricing at DOMSP could fall further below transport cost to average ~\$1.3/MMBtu below Henry before relief comes in Q4, putting basis back to transportation cost of ~80c (between NE and Gulf Coast).

The glut in Northeast Marcellus could become more severe but a Northeast flat price close to the \$2 level could start cutting into the marginal costs of production, thereby slowing production growth.

Third stage 2016 and beyond: Pricing depends on the rate of production growth. If production growth were to slow to ~2-Bcf/d per year from now to 2018, then there appears to be just enough “export” pipe capacity to accommodate the supply growth, assuming 100% pipe utilization throughout the year.

For DOMSP going forward, there will be tension between a push from rising production and a lack of additional pipe capacity to take this gas out of the region, so that basis could take a slight discount vs. transport cost (ie, basis of -\$1 vs. transport cost of 80c). Until we see more pipes, then prices may not recover much.

For Northeast Marcellus, the glut in the Northeast should still be worse than the southwest. Fixed price Transco Leidy should be just above marginal cost of production until we see more new pipes. Hence, Transco Leidy could be a further ~\$1/MMBtu behind DOMSP, as there are much fewer options to move Northeast Marcellus gas out of the region.

However, if production growth were to be 3-Bcf/d or more, then current pipeline reversal and expansion proposals are not enough to relieve the glut. The lack of pipeline takeaway capacity should also force producers to curtail production if they do not have firm transport rights on pipelines to move gas out of the region.

Figure 33. Annual US Northeast gas balance (Bcf/d)

Bcf/d	Demand								Production	Storage Change	Pipeline Needs (+Imports/-Exports)
	Power Generation	Industrials	Residential/ Commercial	Other	Gain from Transco Rockaway Lateral	Gain from Spectra AIM	Total				
Date											
2009	3.2	1.9	6.8	0.5	-	-	12.4	1.6	0.1	10.9	
2010	3.8	2.1	6.7	0.5	-	-	13.2	2.5	(0.2)	10.5	
2011	4.2	2.1	6.8	0.7	-	-	13.8	4.7	0.3	9.4	
2012	5.0	2.1	6.1	0.9	-	-	14.1	7.6	(0.2)	6.4	
2013	4.6	2.2	6.9	1.2	-	-	15.0	11.2	(0.4)	3.4	
2014	4.6	2.2	7.1	1.4	0.1	-	15.5	14.6	0.4	1.3	
2015	5.0	2.2	6.3	1.6	0.6	-	15.3	16.9	(0.2)	(1.8)	
2016	5.1	2.3	6.4	1.7	0.6	0.3	16.4	18.9	(0.3)	(2.8)	
2017	5.1	2.3	6.5	1.9	0.6	0.3	16.7	20.8	(0.3)	(4.4)	
2018	5.1	2.4	6.5	2.0	0.6	0.3	17.0	22.8	0.4	(5.4)	

Source: EIA, Citi Research

Appendix A-1

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