# Next Move in the US-Russia Energy Duel Commodities/Equity Views

## US DOE's proposal should accelerate/boost LNG exports but Russia could counter; Structurally beneficial for US E&Ps

<u>**Commodities Research View**</u>

- **The US Department of Energy's proposal to simplify the LNG export approval process and conduct two studies on the impact of exporting 12 to 20-Bcf/d of LNG could well accelerate and raise LNG exports post-2018.** Before this, Citi expected 8 to 10-Bcf/d of LNG exports by 2020. The high cost of an FERC review as the first step of the overall approval process effectively changes the queue on approvals advancing the prospects of firms with strong financing/marketing backing.
- **We believe the new geopolitical jockeying between US and Russia could be fought over energy exports but Russia may be acquiescing so far**. After the Gazprom deal with China, eroding the oil link in pipeline exports, the firm moved to shore up its European customers, conceding to ENI by giving a price reduction and an "important change in the price indexation." Russia might now race to secure more markets before the global market temporarily saturates, especially with surging volumes from Austrlia. The loosening of US gas export rules could foretell the US's stance on oil exports. Energy importers/overseas end users should be winners. The US may have a more credible strategy: it is cheaper to develop US's export infrastructure than Russia's Eastern Gas Strategy.
- **The proposal could attract potent new entrants into US LNG exports and allow Qatar to keep its global LNG market share**. Qatar's accelerated JV with Exxon at the 2.6-Bcf/d (19.5-mtpa) Golden Pass terminal should help Qatar keep its market share by sourcing gas in another country. Other new entrants could also move ahead quickly if they have favorable financing.
- **A rise in US gas prices looks inevitable but likely limited while global LNG prices should fall more.** US prices in the $5 to mid-$5/MMBtu range should boost supply from Haynesville/Barnett. But global LNG prices could fall to the low end of the $11 to $14 range, near the delivered cost of Russian gas and US LNG into Asia.

<u>**Equity Research View**</u>

- **Structurally beneficial for E&Ps with substantial long-lived gas assets near Gulf Coast.** These events bolster Citi's view that gas prices longer-term (2016+), should be in a $5 to mid-$5 range and elevate confidence in the value of substantial gas assets that investors may give little value to today. These include 'dry' gas assets near the Gulf Coast feeding LNG export projects but attracting very little capital investment now (see our 5/29/13 note). Most E&P management teams are adamant that 'dry' gas plays don't compete with their core oil/liquids-rich plays, for those that have such alternatives, in today's environment unless gas prices are north of $4.50 to $5.00. Thus, Haynesville/Barnett would likely attract renewed investment as a gas source for LNG. E&Ps with large gas reserves in these two plays that could meaningfully boost production include ***Chesapeake Energy***, ***Devon Energy***, ***EOG Resources***, ***EP Energy***, ***Encana Corp.*** and ***Matador Resources.***

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# Commodities Strategy View

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## Overview

**The US Department of Energy's proposal** to streamline the LNG export approval process and conduct two other studies on the impact of exporting 12 to 20-Bcf/d of LNG **could significantly speed up LNG exports post-2018.**

**The move appears to be clearly orchestrated by the White House as a means of accelerating LNG exports given the implications for the loosening Russian strangle on the European gas market**. With the proposal, the DOE looks to:

(1) Change the approval process by removing the conditional approval on exporting to non-FTA countries, a step done before the FERC approval. The DOE would make the final decision after the completion of FERC's review on the siting, constructing and operation of a liquefaction facility. FERC's review involves either an Environmental Impact Statement (EIS) or an Environmental Assessment, as required by the National Energy Policy Act (NEPA);

(2) Reset the approval order based on readiness for project completion and "prioritize resources on more commercially advanced projects:" it also gives priority to financially secured projects, given the ~$100 million cost of a FERC filing;

(3) Undertake two new studies on the impact of exporting between 12 and 20-Bcf/d of LNG on the US natural gas market. This effectively raises the soft cap on exports from 12-Bcf/d to 20-Bcf/d. It also enables the approval process to reduce the level of effectively approved projects from 9.3-bcf/d provisionally approved by DOE to 2.2-bcf/d fully approved by FERC.

This new proposal (see link here) will be subject to a 45-day public review and comment period and the new system could go into effect afterwards.That comment period has been criticized by some Republican Congressman as creating too long a delay and by others as too short given the environmental issues at stake. Meanwhile, the DOE is expected to grant final approvals to Cameron, Freeport and Cove Point, as they have recently completed their EISs or EAs, adding to the 2.2-Bcf/d of capacity with final approval.

**Simplifying the approval procedure would in our view accelerate the process, reduce regulatory uncertainty and encourage LNG project applications because new but strong projects would no longer be deterred because they would no longer be at the back of a long queue.** (a) Given the relatively high cost (as much as $100 million) of an NEPA review, only exporters with strong financing and marketing backing would proceed. In contrast, the existing system generally allows a company to be established and apply for initial approvals costing as low as 5 figures, meanwhile taking up processing time. (b) In its proposal, the DOE also implied that its final approval would probably be granted after an extensive and costly review required by FERC[1]. This re-set of approval order should largely benefit the strongest projects, which have strong incentives to move forward. As the timing and the sequencing of applications become much less of a barrier for these profitable projects in the proposed new system, they could start moving forward more aggressively. The large Exxon-Qatar project, at the back of the current queue, could jump to the front.

[1] Note that this should not change the pace of FERC's approval of individual LNG liquefaction facility

**Figure 1. Current list of conditionally approved and pending LNG terminals. Only Sabine Pass has received FERC's + DOE's final approvals. Freeport, Cameron and Cove Point are expected to receive final DOE approvals. The DOE proposed to get rid of the conditional approval stage.**

| Terminal | Company | Location | mtpa | Bcf/d |
|---|---|---|---|---|
| **Approved (non-FTA)** | | | | |
| Sabine Pass | Cheniere | Cameron, LA | 16.5 | 2.2 |
| Freeport | Freeport/Macquarie | Freeport, TX | 10.5 | 1.4 |
| Lake Charles | Energy Transfer Partners | Lake Charles, LA | 15.0 | 2.0 |
| Cove Point | Dominion | Lusby, MD | 5.8 | 0.8 |
| Freeport expansion | Freeport/Macquarie | Freeport, TX | 3.0 | 0.4 |
| Cameron | Sempra | Hackberry, LA | 12.8 | 1.7 |
| Jordan Cove | Jordan Cove | Coos Bay, OR | 6.0 | 0.8 |
| **Pending** | | | | |
| Oregon | LNG Dev Co. | | 9.4 | 1.3 |
| Corpus Christi | Cheniere | Corpus Christi, TX | 15.8 | 2.1 |
| Lavaca Bay | Exelerate | Port Lavaca, TX | 10.4 | 1.4 |
| Gulf Coast | Gulf Coast LNG | Brownsville, TX | 21.1 | 2.8 |
| Southern LNG | Southern LNG | Savannah, GA | 3.8 | 0.5 |
| Gulf LNG | Gulf Coast LNG Export | Pascagoula, MS | 11.3 | 1.5 |
| CE FLNG | CE FLNG | Plaquemine, LA | 8.0 | 1.1 |
| Golden Pass | Golden Pass Products | Port Arthur, TX | 19.5 | 2.6 |
| South Texas LNG | Pangea LNG | Offshore, TX | 8.2 | 1.1 |
| Main Pass | Freeport-McMoRan | Offshore, LA | 24.2 | 3.2 |
| Sabine Pass | Sabine Pass Liquefaction | Cameron, LA | 2.1 | 0.3 |
| Sabine Pass | Sabine Pass Liquefaction | Cameron, LA | 1.8 | 0.2 |

Source: FERC, Woodmac, Citi Research

**The proposal could attract potent new entrants into US LNG exports and allow Qatar to keep its global LNG market share, adding to global price competition in LNG sales**. Qatar's accelerated JV with Exxon at the 2.6-Bcf/d (19.5-mtpa) Golden Pass terminal should help Qatar keep its market share by sourcing gas in another country. In addition, at first glance, it appears that the decision on a project moving forward would depend on how much the global market could bear. This translates into an ability to market and sell the gas to obtain financing. However, project sponsors, such as foreign utilities with a need for gas, could theoretically move ahead very quickly with very favorable financing terms, perhaps from state-run policy banks, and by partnering with experienced LNG liquefaction operators.

## Potential next moves in this geopolitical chess match over energy: US gaining but Russia acquiescing so far

**The geopolitical positioning between the US and Russia may not be fought over arms built up but the use of energy exports** to establish alliances with importing countries, to push oil and gas prices lower affecting traditional energy exporters (e.g. Russia) reliant on high energy prices for government revenues, to raise the volume of energy exported to offset the impact of lower prices on export revenues, and **perhaps most importantly to change to structure of the global LNG trade Indeed, 2014 could be a momentous year of energy diplomacy.** See Citi's report "A Chess Match Has Just Begun: The Russia-China gas deal's impact on gas, coal and politics" (May'14) for details.

(1) **Russia seems to be acquiescing so far**. What held up a deal with China was Gazprom's fear that a break in the oil link would call into question the pricing basis of its predominant gas market in Europe. But the urgency of signing an agreement with China, given the politics associated with the Ukraine crisis and Russia's political absorption of Crimea, Gazprom is

making price concession in Europe. At the recent St. Petersburg economic summit, a new deal with announced with ENI (the second largest buyer in Europe) providing a price reduction this past week, with an “important change in the price indexation to fully align it with the market.” Getting the deal done with China also reflected Gazprom’s urgency to cement an agreement to give life to its long-term Eastern Gas Strategy while there was still time to secure this market, given China’s aggressiveness in finding alternative pipeline and seaborne supplies and developing its own rich sale gas reserves. **As this year starts a surge in new LNG projects, especially from Australia, which looks likely to grow to rival Qatar in market share, timing for signing up Chinese customers has been critical for Moscow.**

(2) **The US accelerates its transition into a global gas exporter**. The recent Ukrainian tension has raised the need for Europe to reduce its reliance on Russia gas partly by importing more US gas on an accelerated timetable. Pointedly this past week Cheniere Energy signed Spain-based Iberdrola in a twenty year 110-MMcf/d (0.8mtpa) offtake agreement from its proposed Corpus Christi project. Cheniere had already signed Endes Generacion, a Spanish utility for 1.5-mtpa. But beyond these European agreements, any increase in US sales also brings with it incremental changes in market structure, since US purchases can be resold on the spot market or redirected to other end-delivery sites.

(3) **Russia could now race ahead to secure more markets for its gas before the global gas market temporarily saturates**. Russia could entice China to cooperate by reopening talks with more favorable terms on a Western Route, which would send gas to China via a pipe west of Mongolia diverting sales from Europe; or Russia could close more LNG deals with China or other Asian countries. Despite its head start and the potential for exports starting 2014 at Kitimat, Canada’s wait and subsequent fall behind the US and other countries on LNG exports is a cautionary tale.

(4) **The effective loosening of gas export regulations could also foretell the US administration’s stance on oil exports**.

**Over time, this could become a war of attrition** on whether Russia could keep its public finance in order as energy prices fall but gas volume sold potentially increases, or whether rising prices in the US would undermine the viability of US-based LNG projects.

Despite having the majority of LNG projects coming online in the next few years, **Australia** could still have a substantial impact beyond this timeframe. Australian projects are coming online sooner, starting in 2015 up to around 2018 and slightly beyond, vs US projects mostly coming online in 2017+ (other than Sabine Pass) and vs. Russian ones mostly later. However, successful deployments of inexpensive FLNG could have a large impact, unlocking vast offshore resources economically. Nonetheless, foreign policy seems to play a bigger role in Russian and US export policies, rather than Australia.

All in all, we believe **energy importers should be clear winners**, as more gas and oil production and exports globally should lower prices.

## Price implications

**Higher gas exports should push up US gas prices but perhaps not by a significant amount**. Citi's report "The New American Gas Century" presented a detailed examination of the price formation process, combining analyses on (a) basin-level production cost, (b) industry structure and the associated switching cost from oil/liquids drilling to gas, and (c) the severe regional imbalance between supply and demand. Gas price in the $5 to mid-$5/MMBtu, assuming an oil price of $90/bbl WTI, should make dry gas production in once-prolific shale plays such as Haynesville or Barnett economic. The large amount of gas supply from these shale plays should be enough to satisfy demand for domestic uses and gas/LNG exports.

**Figure 2. Indifference gas price matrices: gas prices needed to have a similar return as acorresponding oil/liquids play based on different oil price assumptions**

| $90 Oil | Haynesville | Barnett | Marcellus |
|---|---|---|---|
| Niobrara | 5.3 | 5.0 | 2.9 |
| Permian | 5.6 | 5.3 | 3.1 |
| Eagle Ford | 8.6 | 7.8 | 4.0 |
| Bakken | 8.2 | 7.7 | 4.5 |

| $100 Oil | Haynesville | Barnett | Marcellus |
|---|---|---|---|
| Niobrara | 5.8 | 5.4 | 3.1 |
| Permian | 6.2 | 5.8 | 3.4 |
| Eagle Ford | 9.5 | 8.7 | 4.4 |
| Bakken | 9.1 | 8.5 | 4.9 |

| $85 Oil | Haynesville | Barnett | Marcellus |
|---|---|---|---|
| Niobrara | 5.0 | 4.7 | 2.8 |
| Permian | 5.3 | 5.0 | 2.9 |
| Eagle Ford | 8.1 | 7.4 | 3.9 |
| Bakken | 7.8 | 7.3 | 4.3 |

| $95 Oil | Haynesville | Barnett | Marcellus |
|---|---|---|---|
| Niobrara | 5.5 | 5.2 | 3.0 |
| Permian | 5.9 | 5.5 | 3.2 |
| Eagle Ford | 9.0 | 8.2 | 4.2 |
| Bakken | 8.7 | 8.1 | 4.7 |

Source: Citi Research

**Prices in the $6 range or above could be a soft ceiling as US LNG becomes increasingly uncompetitive**, other forms of power generation become appealing and the demand growth in the industrial/transportation sectors could slow. These prices make US LNG uncompetitive in Europe and possibly Asia because the delivered costs could be $11 in Europe and $12 or more in Asia, at or just over where Russian gas could be priced. However, if the ~$3/MMBtu of capacity charge, generally take-or-pay, for using a liquefaction facility is not included, then delivered costs could be $8 in Europe and $9 or more in Asia, but this is not a profitable venture and the capacity might be sold to others.

Further, the next tranche of gas production might not come until US gas prices are in the $7 to $9 range, which would motivate even oil producers to drill for gas if they have the acreage.

**However, global LNG prices could fall to the low end of the $11 to $14/MMBtu price range, near the delivered cost of Russian gas and US LNG into Asia**. By some measures, Vladivostok LNG would have required $15/MMBtu or more to move ahead. With Russia's piped gas to China, the price range falls to between ~$10 and $12. Chayanda and Kovykta fields in Eastern Siberia would be developed; the "Power of Siberia" pipeline and VLNG would be constructed. This lower price would be competitive vs. US LNG between ~$4 and $6/MMBtu Henry Hub, assuming ~$6/MMBtu in liquefaction, shipping and regasification

## Risk to outlook

Construction delays and rising costs, particularly labor, could slow the growth of US LNG exports. The global LNG market may also not be growing as quickly.

If energy is indeed a potent foreign policy tool in this instance, then making its energy influence as large and as quickly as possible could knock out the opposing

side.  But **in this new era of geopolitics fought using energy exports, the US could have a more credible threat, since developing US's energy export infrastructure, especially at brownfield facilities, could be much less costly than Russia's Eastern Gas Strategy**.

## Sector implications

Some sectors should gain from these developments but others face greater challenges:

Sectors with tailwinds: Higher US gas prices should push up US power prices and, therefore, the profit margins of many power generators.  Infrastructure development should gain both in the US and possibly Russia, as more gas and oil would be transported.  Overseas utilities that source gas overseas but have their retail energy price capped, perhaps due to government regulation, should see better profit margins. Companies outside of the US that operate on large energy feedstock should gain on lower global gas, NGL and oil prices.  Builders of tankers could benefit as well with an increased amount of energy trade.

Sectors with headwinds: Developers of higher cost LNG liquefaction projects elsewhere globally could see their projects uncompetitive vs. US and Russian projects.  Lower global gas prices should make coal-to-gas substitution in the power generation sector more attractive. Combined with a push toward cleaner burning fuels, coal producers should remain under pressure.

Sectors with both tailwinds and headwinds: The construction sector may benefit due to more activities in US and Russia, projects elsewhere, such as MENA, or other higher cost facilities could be shelved.  US-based industries could see future feedstock costs higher than previously expected but still lower than projected several years ago and still below those in Europe and Asia, as North American prices would remain below Europe and Asia.

# Equity Research View

Robert S. Morris

**Structurally Beneficial For E&Ps With Substantial Long-Lived Gas Assets Near Gulf Coast.** These events bolster Citi's view that gas prices longer-term (beginning 2016), should be in a $5.00 to mid-$5.00/MMBtu range and, in turn, elevate confidence in the value of substantial gas assets that investors may give little value to today. These would include 'dry' gas assets near the Gulf Coast that could feed LNG export projects and that are attracting very little capital investment now (see our 5/29/13 note).

Further, we believe increased natural gas demand for LNG projects, especially along the Gulf Coast where infrastructure bottlenecks do not exist, could lead to a re-rating for shallow, long-lived production in the region. Most E&P management teams are adamant that 'dry' gas plays do not compete with their core oil and/or liquids-rich plays, for those that have such alternatives, in today's environment unless gas prices are north of $4.50 to $5.00/MMBtu. Thus, core areas of the Barnett and particularly the Haynesville would likely attract renewed investment as a source of gas for LNG projects. E&P companies with substantial gas reserves in these two plays that could meaningfully boost production include ***Chesapeake Energy***, ***Devon Energy***, ***EOG Resources***, ***EP Energy***, ***Encana Corp.*** and ***Matador Resources.***

Outside of additional investment to grow production volumes, we view transaction valuations for existing production as the most appropriate baraometer for share price performace as the market would likely re-rate the valuation for these assets. Transactions values for shallow natural gas producing assests have been approximately ~$5,000 per Mcf/d since 2012 as publicly traded E&P's have shifted their portfolio toward oil and liquids rich projects. This transaction value has held consistent for Appalachia, Rockies, and Gulf Coast natural gas assets. In Figure 3 below, we highlight companies in our E&P coverage group with Gulf Coast natural gas assets, including Haynesville and Barnett, and detail the share price sensitivity to a higher transaction value for this production using $6,000 per Mcf/d. We view this as as an attainable level for furture transactions in a $5.00+ Henry Hub natural gas price environment for assets with shallow declines, an advantageous position close to Gulf Coast demand and where existing infrastructure is in place. Through this analysis, Chesepeake (Citi – Buy) and Devon (Citi – Neutral) appears to have the greatest leverage and upside in our coverage group.

**Figure 3. Company Leverage To Gulf Coast Natural Gas Production**

| | Ticker | Net Acres | Resource Potential (Bcf) | Current Net Production (Mcf/d) | Total N.A. Natual Gas Production (Mcf/d) | % of Total N.A. Natual Gas Production | Value at $5,000/flowing ($mm) | Value at $6,000/flowing ($mm) | Increase $/Share | % Upside |
|---|---|---|---|---|---|---|---|---|---|---|
| Anadarko | APC | 206,000 | 11,588 | 237,660 | 2,600,000 | 9% | $1,188 | $1,426 | $0.5 | 0% |
| Chesapeake | CHK | 602,000 | 27,144 | 924,000 | 5,792,228 | 16% | $4,620 | $5,544 | $1.4 | 5% |
| Devon | DVN | 600,000 | 15,000 | 943,944 | 1,840,000 | 51% | $4,720 | $5,664 | $2.3 | 3% |
| Encana | ECA | 200,000 | 11,250 | 331,000 | 1,191,680 | 28% | $1,655 | $1,986 | $0.4 | 2% |
| EOG | EOG | 441,000 | 15,494 | 358,200 | 1,728,540 | 21% | $1,791 | $2,149 | $0.7 | 1% |
| EP Energy | EPE | 36,900 | 2,076 | 112,000 | 216,000 | 52% | $560 | $672 | $0.5 | 2% |
| Matador | MTDR | 25,100 | 1,412 | 12,624 | 37,868 | 33% | $63 | $76 | $0.2 | 1% |

Source: Citi Research

In Figures 4 and 5 below we summarize drilling activity, investment, and production volumes for several large oporators in the Haynevsille shale.

## Figure 4. Estimated Capital Budget and Operated Rig Count By Operator in the Haynesville Shale

| Company | CapEx 2012 ($mm) | CapEx 2013 ($mm) | CapEx 2014 ($mm) | CapEx Chg (2012-11) | CapEx Chg (2013-12) | CapEx Chg (2014-13) | CapEx Chg % (2012-11) | CapEx Chg % (2013-12) | CapEx Chg % (2014-13) |
|---|---|---|---|---|---|---|---|---|---|
| Anadarko Petroleum (APC) | 443 | 444 | 480 | 301 | 1 | 36 | 212% | 0% | 8% |
| Chesapeake Energy (CHK) | 650 | 224 | 500 | (1,267) | (426) | 276 | -66% | -66% | 123% |
| EnCana Corp. (ECA) | 337 | 210 | 100 | (681) | (127) | (110) | -67% | -38% | -52% |
| EOG Resources (EOG) | 112.5 | 50 | 0 | (238) | (63) | (50) | -68% | -56% | -100% |
| EP Energy (EPE) | 97 | 1 | 3 | (691) | (96) | 2 | -88% | NA | NA |
| Plains (PXP) / Freeport (FCX) | 128 | 91 | 75 | (88) | (37) | (16) | -41% | NA | NA |
| **Total** | **2,169** | **1,267** | **1,407** | **(3,630)** | **(902)** | **140** | **-63%** | **-42%** | **11%** |

| Company | Rigs Q4'13 | Rigs 2013 | Rigs Q1'14 | Rigs Q2'14 | Rigs Q3'14 | Rigs Q4'14 | Rigs 2014 | Rigs Chg (2012-11) | Rigs Chg (2013-12) | Rigs Chg (2014-13) | Rigs Chg % (2013-12) | Rigs Chg % (2014-13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Anadarko Petroleum (APC) | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 1 | -1 | -1 | -13% | -15% |
| Chesapeake Energy (CHK) | 3 | 2.25 | 5 | 8 | 8 | 8 | 7.25 | -24 | -3 | 5 | -133% | 69% |
| EnCana Corp. (ECA) | 3 | 4 | 2 | 0 | 0 | 0 | 1 | -13 | 2 | -3 | 53% | -650% |
| EOG Resources (EOG) | 1 | 1 | 0 | 0 | 0 | 0 | 0 | -5 | -1 | -1 | -125% | NA |
| EP Energy (EPE) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA |
| Plains (PXP) / Freeport (FCX) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA |
| **Total** | **18** | **16** | **16** | **17** | **17** | **17** | **17** | **(57)** | **(7)** | **1** | **-43%** | **3%** |

Source: Citi Research

## Figure 5. Gross and Net Production By Operator in the Haynesville Shale

| Company | Gross (MMcf/d) Q4'13 | 2013 | Q1'14 | Q2'14 | Q3'14 | Q4'14 | 2014 | Chg (2013-12) | Chg (2014-13) | Chg % (2013-12) | Chg % (2014-13) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Anadarko Petroleum (APC) | 311 | 299 | 317 | 335 | 353 | 373 | 344 | 78 | 45 | 35% | 15% |
| Chesapeake Energy (CHK) | 918 | 1,245 | 825 | 866 | 970 | 1,087 | 937 | (582) | (308) | -32% | -25% |
| EnCana Corp. (ECA) | 326 | 435 | 414 | 393 | 373 | 355 | 384 | (159) | (51) | -27% | -12% |
| EOG Resources (EOG) | 113 | 131 | 110 | 106 | 102 | 98 | 104 | (34) | (27) | -21% | -21% |
| EP Energy (EPE) | 191 | 248 | 171 | 155 | 142 | 128 | 149 | (196) | (99) | -44% | -40% |
| Plains (PXP) / Freeport (FCX) | 162 | 172 | 136 | 126 | 116 | 108 | 121 | (61) | (51) | -26% | -29% |
| **Total** | **2,823** | **3,371** | **2,695** | **2,686** | **2,736** | **2,803** | **2,730** | **(1,135)** | **(641)** | **-25%** | **-19%** |
| **Est. Haynesville Total Production** | **4,343** | **5,186** | **4,146** | **4,132** | **4,210** | **4,312** | **4,200** | **(2,324)** | **(986)** | **-31%** | **-19%** |
| % of Est. Haynesville Total Output | 65% | 65% | 65% | 65% | 65% | 65% | 65% | | | | |

| Company | Net (MMcf/d) Q4'13 | 2013 | Q1'14 | Q2'14 | Q3'14 | Q4'14 | 2014 | Chg (2013-12) | Chg (2014-13) | Chg % (2013-12) | Chg % (2014-13) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Anadarko Petroleum (APC) | 233 | 225 | 238 | 251 | 265 | 279 | 258 | 59 | 34 | 35% | 15% |
| Chesapeake Energy (CHK) | 551 | 747 | 495 | 520 | 582 | 652 | 562 | (349) | (185) | -32% | -25% |
| EnCana Corp. (ECA) | 261 | 348 | 331 | 314 | 299 | 284 | 307 | (127) | (41) | -27% | -12% |
| EOG Resources (EOG) | 90 | 105 | 88 | 85 | 81 | 78 | 83 | (27) | (22) | -21% | -21% |
| EP Energy (EPE) | 125 | 163 | 112 | 102 | 93 | 84 | 98 | (128) | (65) | -44% | -40% |
| Plains (PXP) / Freeport (FCX) | 122 | 129 | 102 | 94 | 87 | 81 | 91 | (46) | (38) | -26% | -29% |
| **Total** | **1,904** | **2,268** | **1,837** | **1,825** | **1,848** | **1,883** | **1,848** | **-742** | **-420** | **-25%** | **-19%** |
| % of Est. Haynesville Total Output | | | | | | | -12% | | | | |

Source: Citi Research

In Figures 6 and 7 below we summarize drilling activity, investment, and production volumes for several large oporators in the Barnett shale.

## Figure 6. Estimated Capital Budget and Operated Rig Count By Operator in the Barnett Shale

| Company | CapEx 2012 ($mm) | CapEx 2013 ($mm) | CapEx 2014 ($mm) | CapEx Chg (2012-11) | CapEx Chg (2013-12) | CapEx Chg (2014-13) | CapEx Chg % (2012-11) | CapEx Chg % (2013-12) | CapEx Chg % (2014-13) |
|---|---|---|---|---|---|---|---|---|---|
| Chesapeake Energy (CHK) | 250 | 224 | 200 | (530) | (26) | (24) | -68% | -10% | -11% |
| Devon Energy (DVN) | 900 | 500 | 260 | 0 | (400) | (240) | 0% | -44% | -48% |
| EOG Resources (EOG) | 600 | 100 | 50 | (200) | (500) | (50) | -25% | -83% | -50% |
| **Total** | **1,845** | **849** | **565** | **(907)** | **(996)** | **(284)** | **-31%** | **-54%** | **-33%** |

| Company | Rigs Q4'13 | Rigs 2013 | Rigs Q1'14 | Rigs Q2'14 | Rigs Q3'14 | Rigs Q4'14 | Rigs 2014 | Rigs Chg (2012-11) | Rigs Chg (2013-12) | Rigs Chg (2014-13) | Rigs Chg % (2013-12) | Rigs Chg % (2014-13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chesapeake Energy (CHK) | 1 | 2 | 1 | 1 | 1 | 1 | 1 | (11) | (2) | (1) | -56% | -43% |
| Devon Energy (DVN) | 5 | 6 | 4 | 2 | 2 | 2 | 3 | (2) | (5) | (3) | -45% | -57% |
| EOG Resources (EOG) | 2 | 2 | 0 | 0 | 0 | 0 | 0 | (5) | (5) | (2) | -69% | -100% |
| **Total** | **9** | **10** | **6** | **4** | **4** | **4** | **5** | **(18)** | **(12)** | **(6)** | **-41%** | **-55%** |

Source: Citi Research

## Figure 7. Gross and Net Production By Operator in the Barnett Shale

| Company | Gross (MMcf/d) Q4'13 | 2013 | Q1'14 | Q2'14 | Q3'14 | Q4'14 | 2014 | Chg (2013-12) | Chg (2014-13) | Chg % (2013-12) | Chg % (2014-13) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chesapeake Energy (CHK) | 940 | 1,054 | 915 | 901 | 894 | 887 | 899 | (92) | (155) | -8% | -15% |
| Devon Energy (DVN) | 1,399 | 1,441 | 1,293 | 1,229 | 1,180 | 1,132 | 1,209 | (12) | (233) | -1% | -16% |
| EOG Resources (EOG) | 350 | 388 | 338 | 325 | 313 | 300 | 319 | (100) | (69) | -21% | -18% |
| **Total** | **3,000** | **3,225** | **2,773** | **2,765** | **2,701** | **2,639** | **2,735** | **(355)** | **(491)** | **-10%** | **-15%** |
| **Estimated Barnett Total Production** | **4,536** | **4,860** | **4,192** | **4,179** | **4,083** | **3,990** | **4,134** | **(386)** | **(726)** | **-7%** | **-15%** |
| % of Est. Barnett Total Output | 66% | 66% | 66% | 66% | 66% | 66% | 66% | | | | |

| Company | Net (MMcf/d) Q4'13 | 2013 | Q1'14 | Q2'14 | Q3'14 | Q4'14 | 2014 | Chg (2013-12) | Chg (2014-13) | Chg % (2013-12) | Chg % (2014-13) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chesapeake Energy (CHK) | 444 | 512 | 429 | 420 | 416 | 412 | 419 | (55) | (93) | -10% | -18% |
| Devon Energy (DVN) | 1,021 | 1,052 | 944 | 897 | 861 | 826 | 882 | (9) | (170) | -1% | -16% |
| EOG Resources (EOG) | 280 | 310 | 270 | 260 | 250 | 240 | 255 | (80) | (55) | -21% | -18% |
| **Total** | **1,912** | **2,062** | **1,794** | **1,743** | **1,697** | **1,651** | **1,721** | **(233)** | **(341)** | **-10%** | **-17%** |

Source: Citi Research

Companies mentioned: (APC.N; US$102.86; 1); (CHK.N; US$28.72; 1H); (DVN.N; US$73.90; 2); (ECA.N; US$23.31; 2); (EOG.N; US$105.80; 1); (EPE.N; US$20.06; 1); (FCX.N; US$34.05; 3); (MTDR.N; US$24.88; 2H)

# Appendix A-1

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