Upstream Matters! 2015 Update

To better understand upstream economics in the U.S., we benchmark a sample of producers with large domestic positions. Our sample represents the top tier of U.S. producers including leading shale players from **2009 to 2015**.

- The 12 publicly traded companies we examine comprise about **21%** of U.S. total marketed natural gas production and **18%** of U.S. oil and liquids production.
- In this snapshot including **2015** reporting we state results mainly in barrel of oil equivalent terms.
- In keeping with the overall industry trend, our sample was impacted by a **54%** cut in capex as compared to 2014 and negative reserve revisions **(Figure 1)**. The inventory of Proved Undeveloped Reserves (PUDs) declined by **39% (Figure 2)**.

CEE analysis based on company reports.

Figure 1: US Annual All Source Additions (Net) and Annual Capex

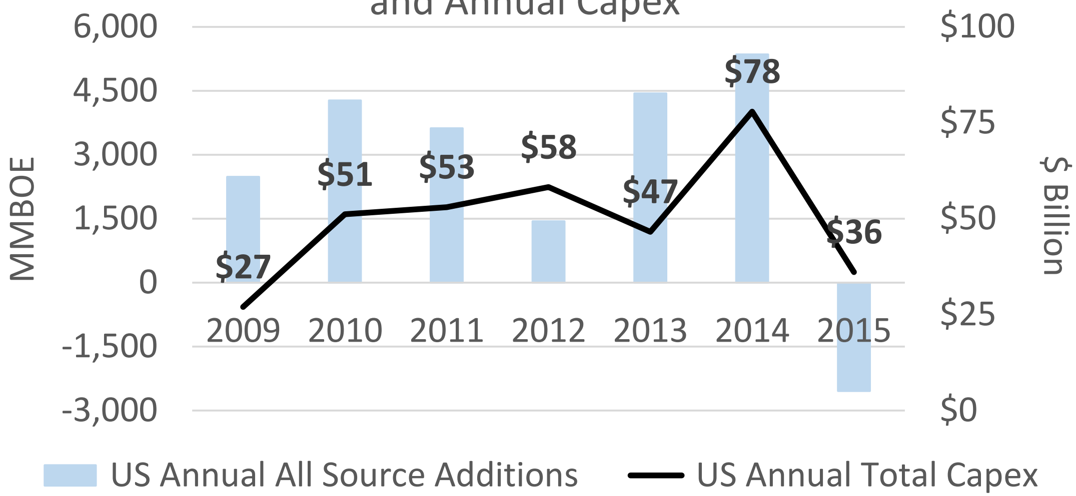
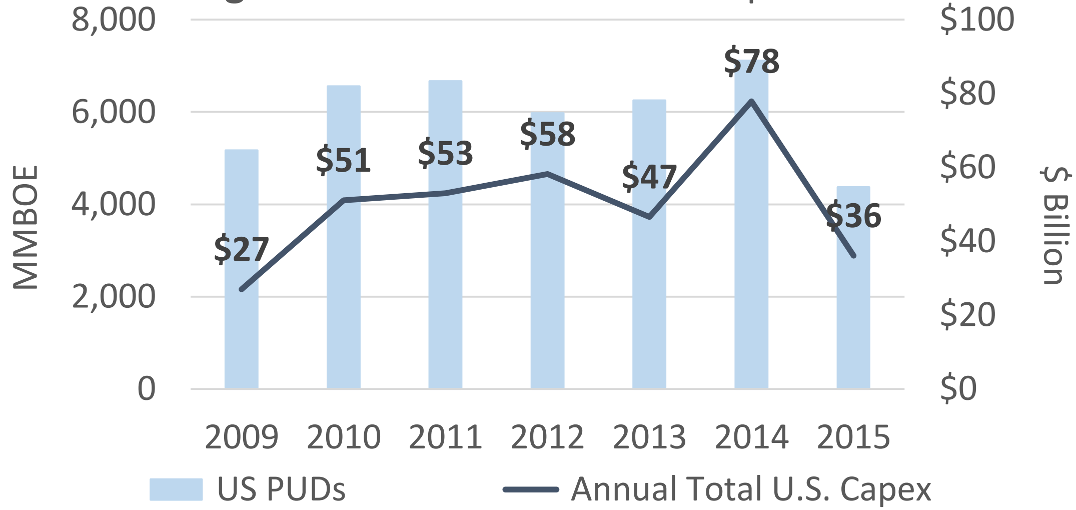


Figure 2: US PUDs vs. Annual Capex



We add 2015 reporting data and affirm key assumptions going forward. <u>We dropped three companies from our 2014 sample and restated results in order to focus our analysis on U.S independents and key basins.</u>

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Computing Returns

With reduced spending and reserve revisions, our rolling 3-year capex per BOE increases.

- In BOE terms, on average and as of **<u>2015</u>, the full cycle cost for our sample is about $42/BOE** with a **10%** return assumed **(Figure 3)**.
- However, a 10 percent return of **less than $4/BOE** compares to current year capital spending of nearly **$19/BOE** for the group. Either more robust oil prices or more dramatic cuts in spending are needed to enable our sample of companies and the industry to balance spending and cash flow **(see slide 5)**.
- As in previous research reports, we note that if producers had to rely on natural gas markets and prices their cost structures would require considerably higher prices **(Figure 4)**.

*We note that many producers realize considerably less than the traded domestic oil prices. In 2015, on average, producers realized just over **$23/BOE**. Natural gas comprised about **32%** of producer revenue with producers realizing considerably less than market. Liquids production rich in condensate fetches a lower price than black oil. "Lighter" production slates mean lower sales revenue than could be earned with black oil (WTI equivalent quality).*

Figure 3: Cost Stack with 10% Return ($/BOE)

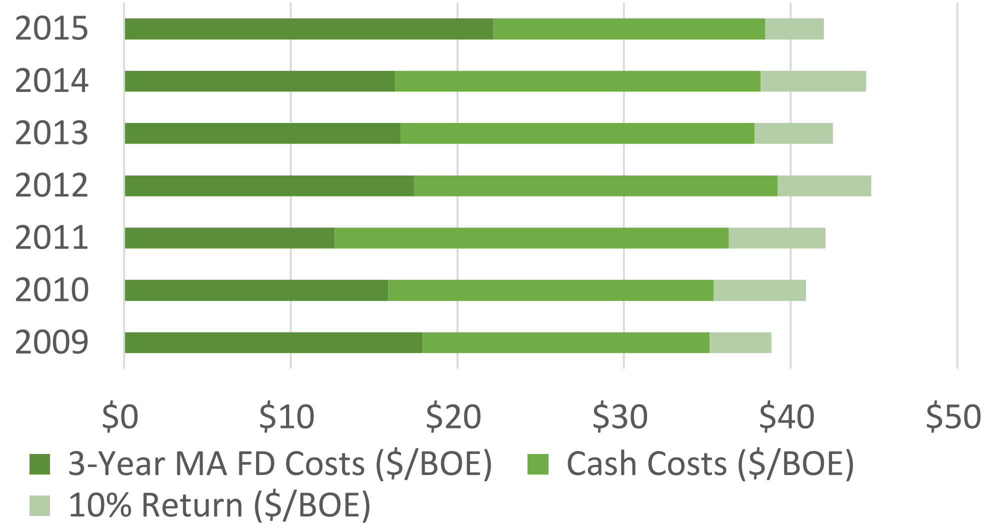
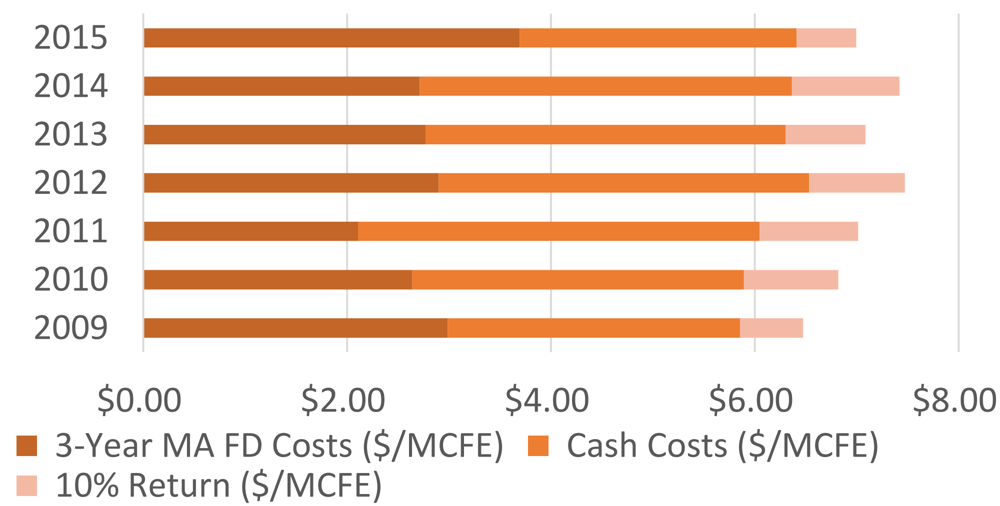


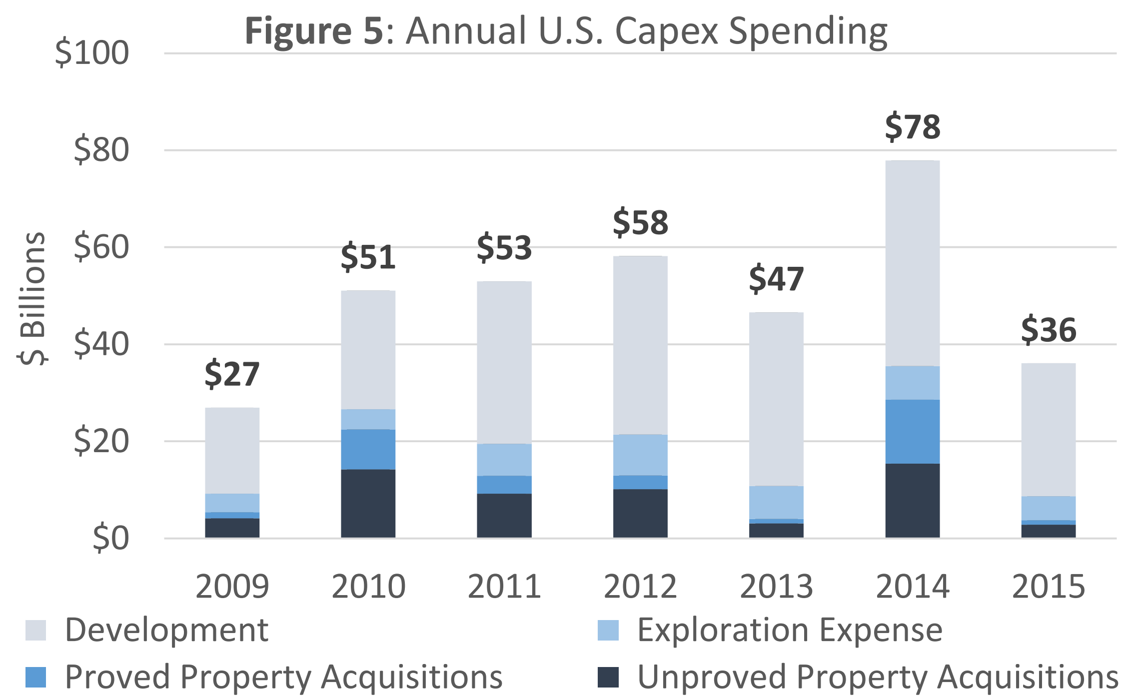
Figure 4:Cost Stack with 10% Return ($/MCFE)

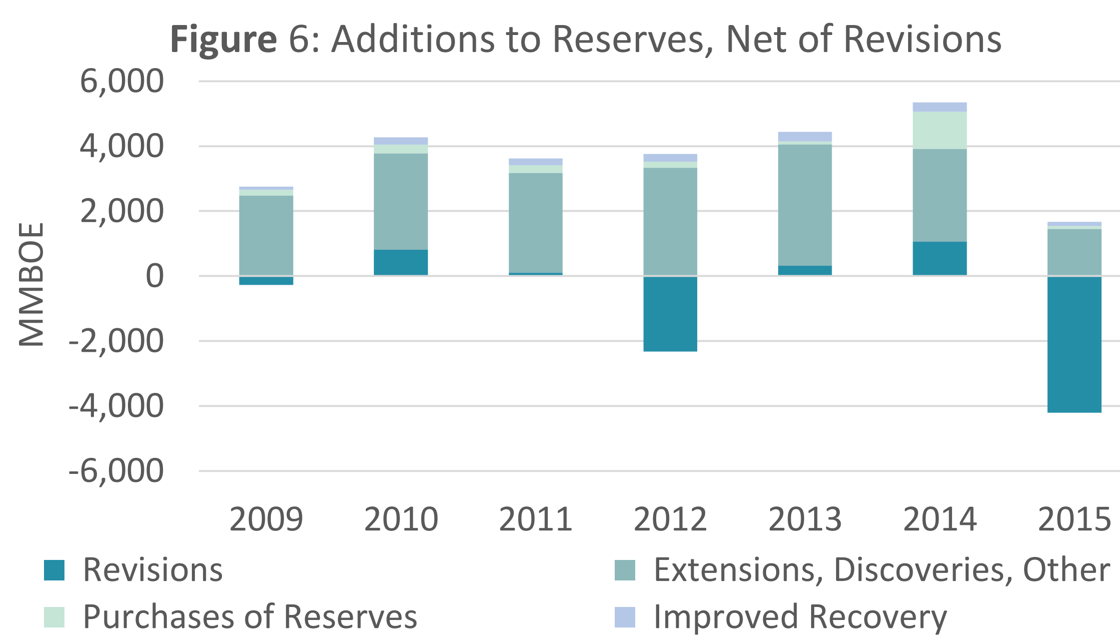


FD = capital spending for exploration and development, calculated on a 3-year basis and applied to 3-year reserve additions as a moving average (MA)
Cash cost = current year lease operating expense, production costs, general and administrative, marketing, taxes (including state production tax), interest on debt, applied to current year production

How much spending? With what results?

- The capex requirements to “high grade” upstream, especially shale, portfolios have been considerable, reaching **$314 billion** by 2014 for these 12 companies.
- The dominant driver for capital spending is development.
- **Substantial write downs and impairments were taken (Figure 6 and Figure 1)** as a result of substantially lower commodity prices for all production stream components (black oil, lease condensate, natural gas and natural gas plant liquids).
- Most gains in domestic production come from extensions, discoveries and other results from acreage already in production. Exploration expense remains a small component of spending **(Figure 5)** and improved recovery a very small component of reserves changes **(Figure 6)**.





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Production Trends

We use cash costs against current production for cash cost/BOE.

- Production costs are the larger portion **(Figure 7), 63% of total opex in 2015.**
- Lower prices and throughputs have reduced midstream fees to producers, creating stress on *midstream MLPs.
- Production (non-income) taxes have been falling since 2011 and declining in share of total opex.

Companies have grown total production **about 36%** since 2010. However, natural gas production plateaued and began to decline gently as companies worked to improve higher value liquids yields **(Figure 8)**.

***Half of the 12 companies in our sample are predominantly gas producers** (50 to nearly 100 percent of production).*

**We will release a midstream research update in April.*

Figure 7: Annual U.S. Cash Costs Breakdown

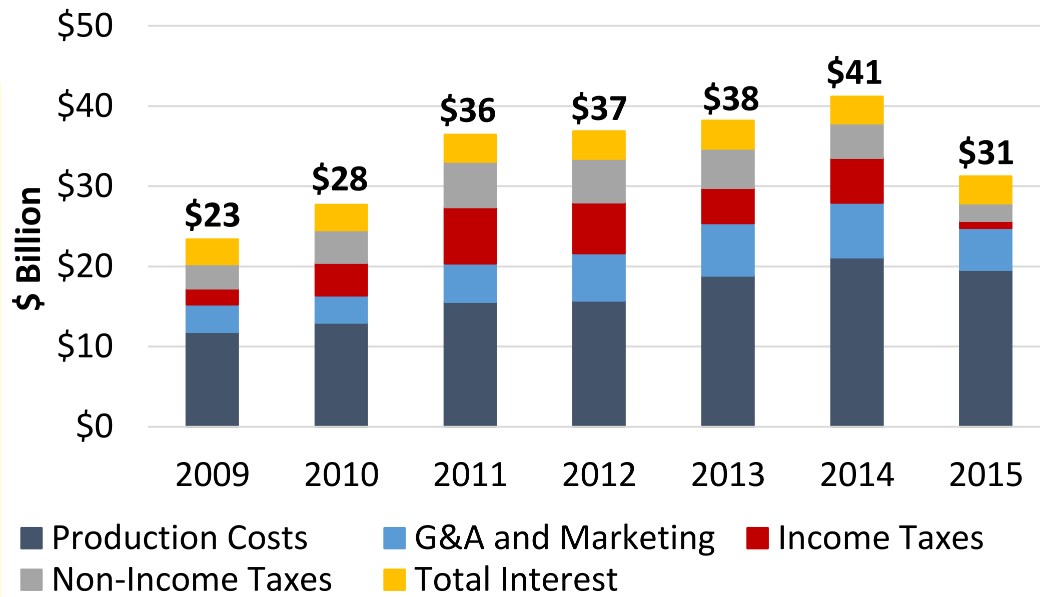
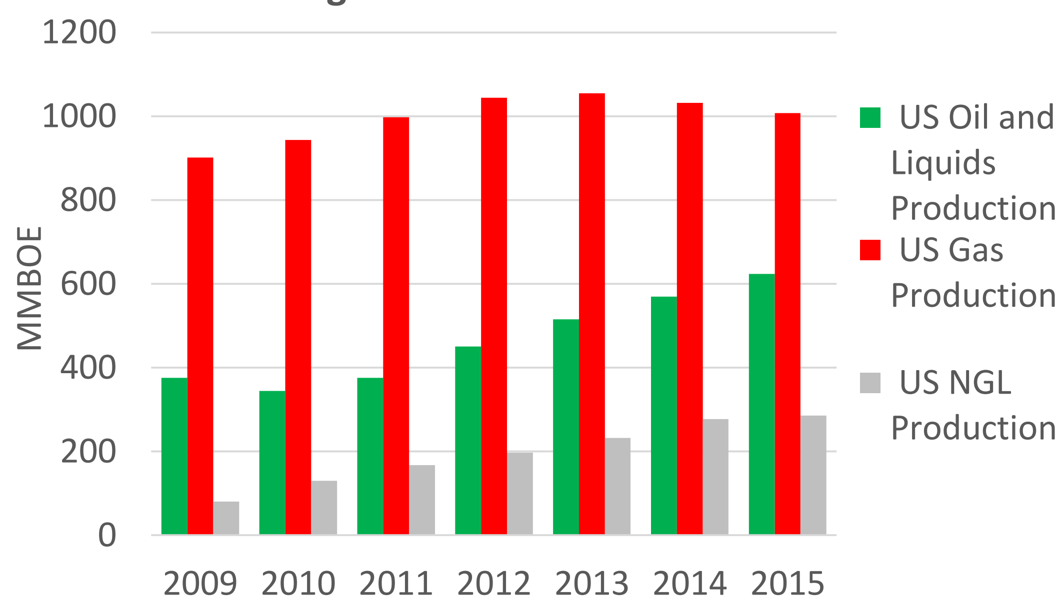


Figure 8: Annual Production



Implications for Gas

Natural gas remains the dominant proportion of production streams but by 2015 was close to **53%** for our sample. This pattern holds when we compare our results to other research. ***The implications for natural gas are interesting to consider.***

- Much of the incremental gas supply for the U.S. in recent years has come in association with liquids production or where enough ethane is present and can be captured to justify drilling in non-associated (dry) gas locations. **Perhaps as much as 50 percent or more of total U.S. gas supply is linked to liquids prices.**
- Persistently low natural gas prices are exacerbating the effect of lower oil and liquids prices.

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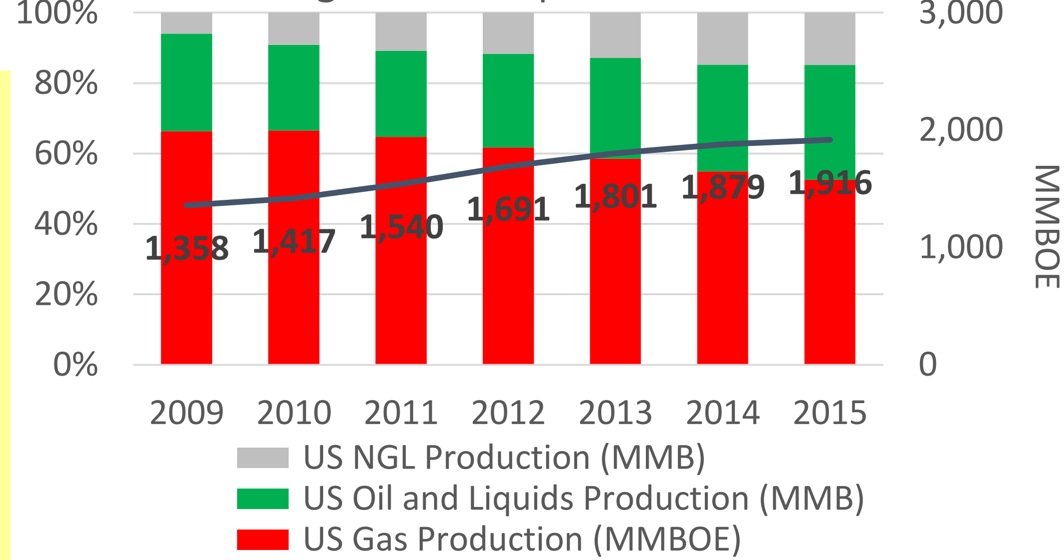


Figure 9: An Equivalent Barrel

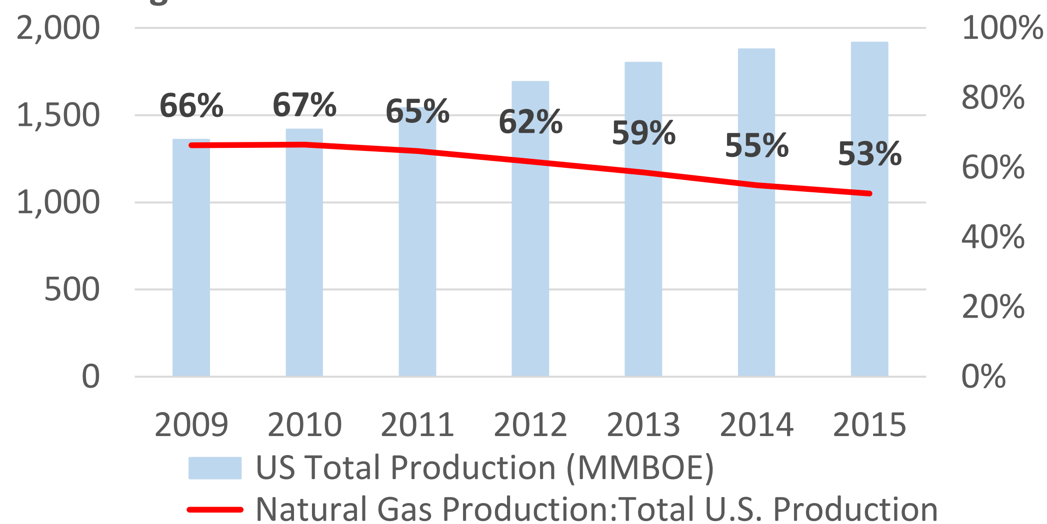
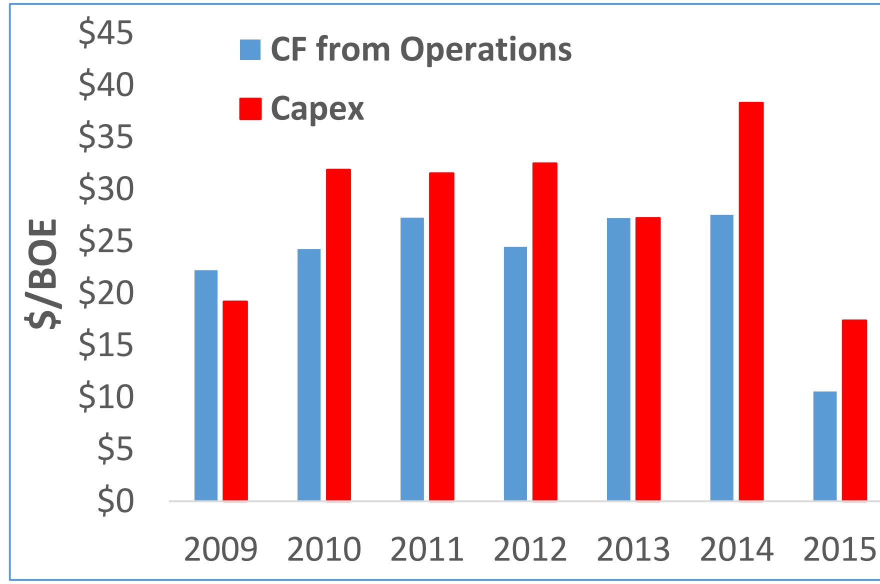


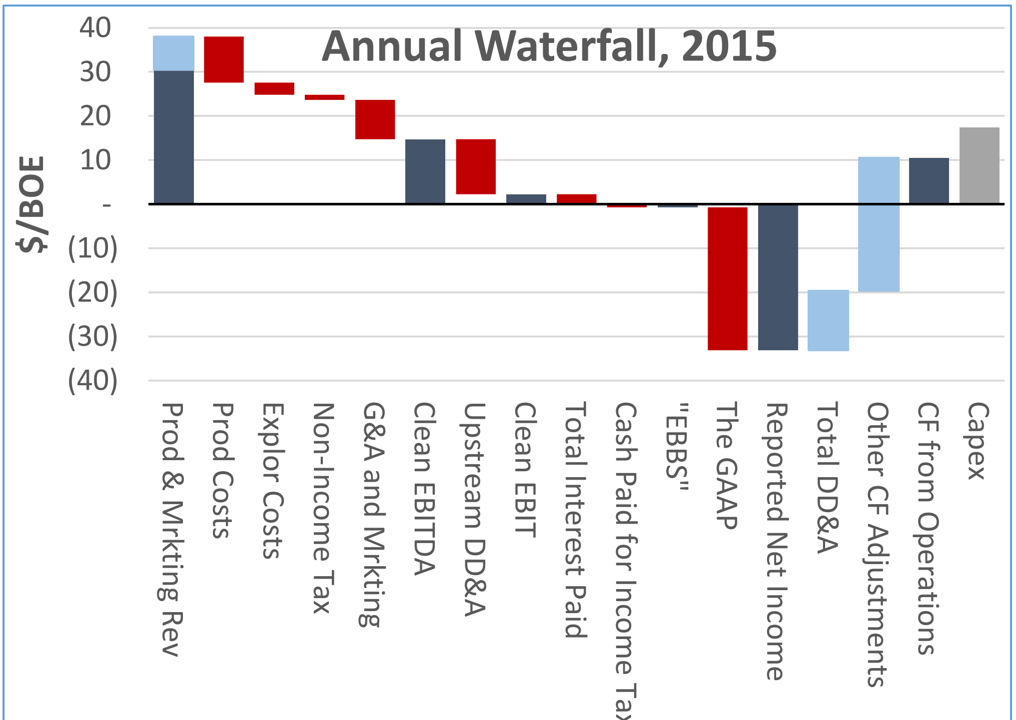
Figure 10: Natural Gas Share of Annual Production

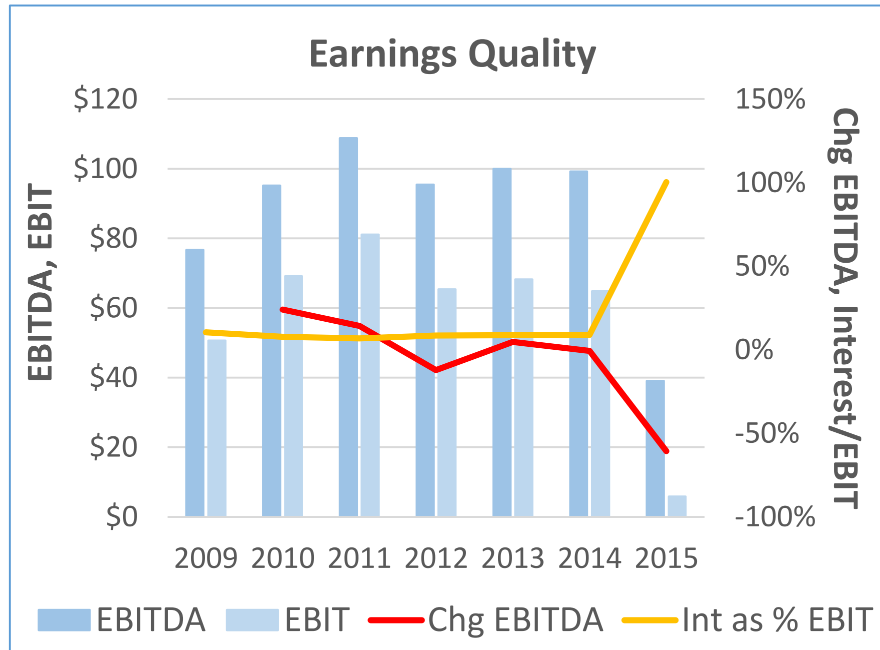
The cheapest producers are also the “gassiest” – smaller companies that, for the most part, did not move out of gas and into liquids because of cost and capital constraints.

Bonus: Cash Flow Waterfall Preview

Overall, the industry remains predominantly cash flow negative. Companies have spent well above cash flow from operations to replace production and improve leasehold positions. ***With lower oil prices companies are working to adjust capital spending to fall within cash flows. However, the negative cash flow trend pre-dates 2009 and is widespread through the U.S. upstream sector, which suggests the industry is heavily dependent upon capital markets.***







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