Could the Math be Wrong?

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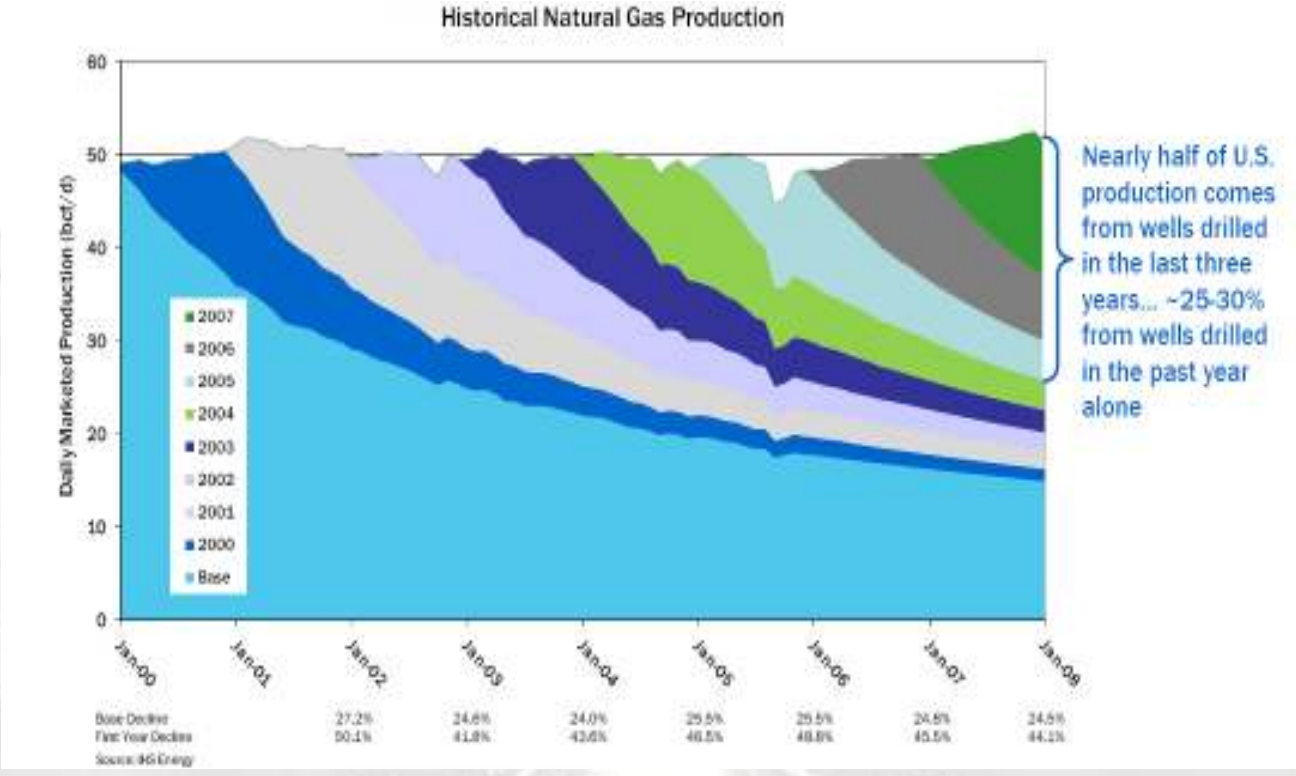
Considering that all of Fortress's revenue comes from conventional natural gas production, I am keenly interested in the North American Natural Gas Market and clearly have a bias towards improving market conditions. I have been an industry observer my entire career and one thing I have learned is that oil and gas production declines. The recent article I wrote entitled "Has Any One Done the Math?" has some experts providing many different opinions with respect to expected decline rates in North America and new drilling efficiency that have emerged. Below is a discussion of some of the key assumptions of the analysis and the sensitively of the conclusion using differing assumptions. The bottom line is there is a looming North American Gas supply crunch that will be upon us, sooner than most expected.

US Production Decline Rates:
Decline rates appear to be a hotly contested issue among energy analysts and it is rare that there is published analysis on the subject; it is often referred to in simple commentary. This chart was prepared by Chesapeake Energy and Indicates the US production decline profiles year by year.



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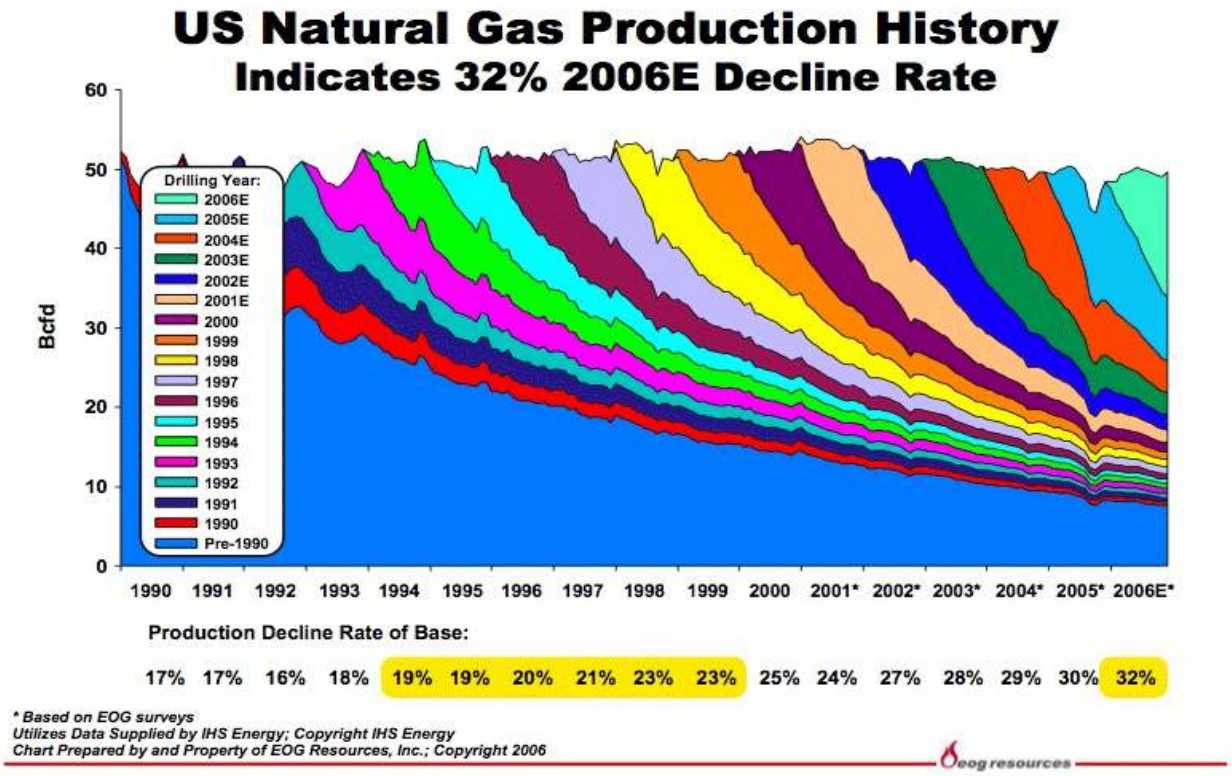
If Base decline rate is 24.5% (production from wells drilled pre 2000) and First Year decline rate is 44.1% then the weighted average decline rate of the entire production profile is 36%. Perhaps observing Canadian production can add some insight into production declines in the US. All gas wells drilled and put on stream in Canada in May 2008 averaged 928mcf/d during the first three month of production and produced on average 537mcf/d one year later representing a first year decline of 42%. Further support of 30% plus average decline rates is this following graph produced by EOG Resources.



Nevertheless, let's assume that the US decline rate is 25% versus the 35% used in the article "Has Anyone Done the Math" and work the analysis through.

Base Production (bcf/d)	56.0
Decline Rate (% per annum)	25%
Production Decline (bcf/d)	14.0
Production Gains 2007 Versus 2008 (bcf/d)	3.0
Natural Gas Wells Drilled in 2008	36,432
Average First Year Production Rate per Well (mcf/d)	467

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In this analysis I have added the increase in production in the US from the beginning of January 1, 2008 to December 31, 2008 of 3 bcf/d resulting in 17 bcf/d of production being added from 36,427 wells being drilled and placed on stream in 2008. Each well drilled in 2008 added on average 467 mcf/d of production. Assuming 700 natural gas directed rigs operating it would result in a decline of 6 bcf/d over the course of a year.

	Jun-09	2008
Number of Active Gas Rigs	700	1,491
Days per Well	15	15
Wells per Year per Rig	24	24
Wells Drilled per Year	17,104	36,432
Average First Year Production Rates mcf/d	467	467
Incremental Production bcf/d	8.0	14.0

The question remains about the impact of the highly prolific shale gas wells and the effect may have on the production profiles in the US. Using the same methodology we can again calculate the estimated impact of the gas shale drilling assuming a lower decline rate of 25%.

	2008		
	Total	Conventional Gas	Horizontal Gas Wells
Number of Active Gas Rigs	1,491	1,012	479
Days per Well	15	12	35
Wells per Year per Rig	24	31	10
Wells Drilled per Year	36,432	31,430	4,997
Average First Year Production Rate (mcf/d)	467	225	1,400
Incremental Production (bcf/d)	14.0	7.1	7.0

There were 479 horizontal gas directed drilling rigs operating in 2008 and if we assume that each rig drilled 10 wells per year (35 days) the number of horizontal shale wells drilled would be 4,373. If the average conventional well contributed 225mcf/d in 2008, the average horizontal shale well would have produced 1.4 mmcf/d and had initial production rate of 1.8 mmcf/d (assuming 60% first year decline).

Using these assumptions, and 25% average US decline rates we can now calculate the impact of 700 gas directed drilling rigs and factor in the high productivity of the gas shales.

	Total	Conventional Gas	Horizontal Shale Gas
Number of Active Gas Rigs	700	402	298
Days per Well	15	12	35
Wells per Year per Rig	22	31	10
Wells Drilled per Year	15,604	12,500	3,104
Average First Year Production Rate (mcf/d)	459	225	1,400
Incremental Production (bcf/d)	7.2	2.8	4.3

Notwithstanding the high productivity from shale gas there still remains a supply decline of 6.5 bcf/d at the current pace of drilling.

Fewer rigs can drill more wells!!!

Is there evidence of this beyond simple premise that the industry becomes more efficient with experience and with the down turn only the best crews are left working? I believe both of these statements to be true and we now have enough information to measure the affect of improved efficiencies and how that factors into the analysis.

The following graph is a plot of the average number days required to drill a natural gas well in the US from January 2007 to July 2009, which does not provide support of the thought of a fewer number of more efficient rigs can drill a greater number of wells.

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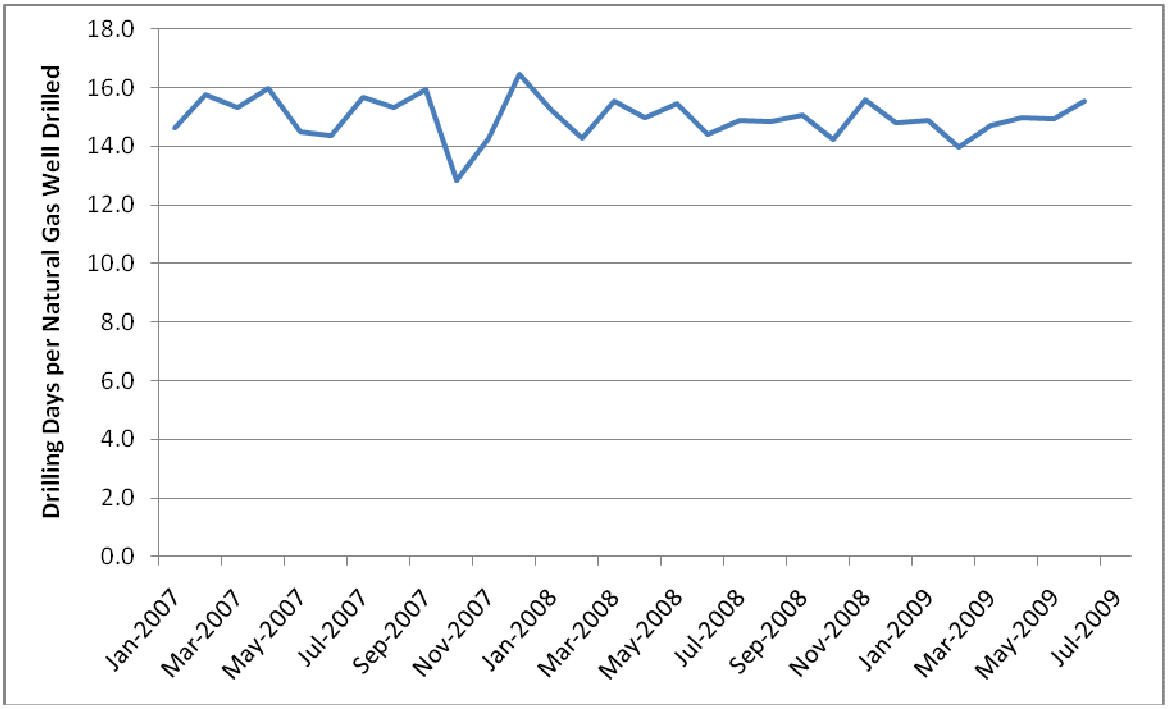
AVERAGE DRILLING DAYS PER NATURAL GAS WELL DRILLED



The increased percentage of horizontal gas wells is no doubt having the result of increasing the footage drilled per well. The conclusion one might draw is that the longer horizontal wells are being drilled in less time but there are not more total wells being drilled with fewer rigs. If so, the improved efficiency are captured in the production per well rather than the number of wells each rig can drill.

There is no disputing that the current drilling activity will lead to supply demand imbalances which cannot be avoided even considering the highly productive nature of the shales. **So why is it that we are not observing greater production declines in the US with such low drilling activity?**

When we do the math the story become very clear!

It is not because:

1. The highly productive nature of the shales that are making up for the expected declines
2. The drilling efficiency being experienced allowing more highly productive wells to be drilled with fewer rigs.

Although these factors contribute to the supply demand balances they do not provide an explanation to the apparently resilient US production rates and swelling inventories.

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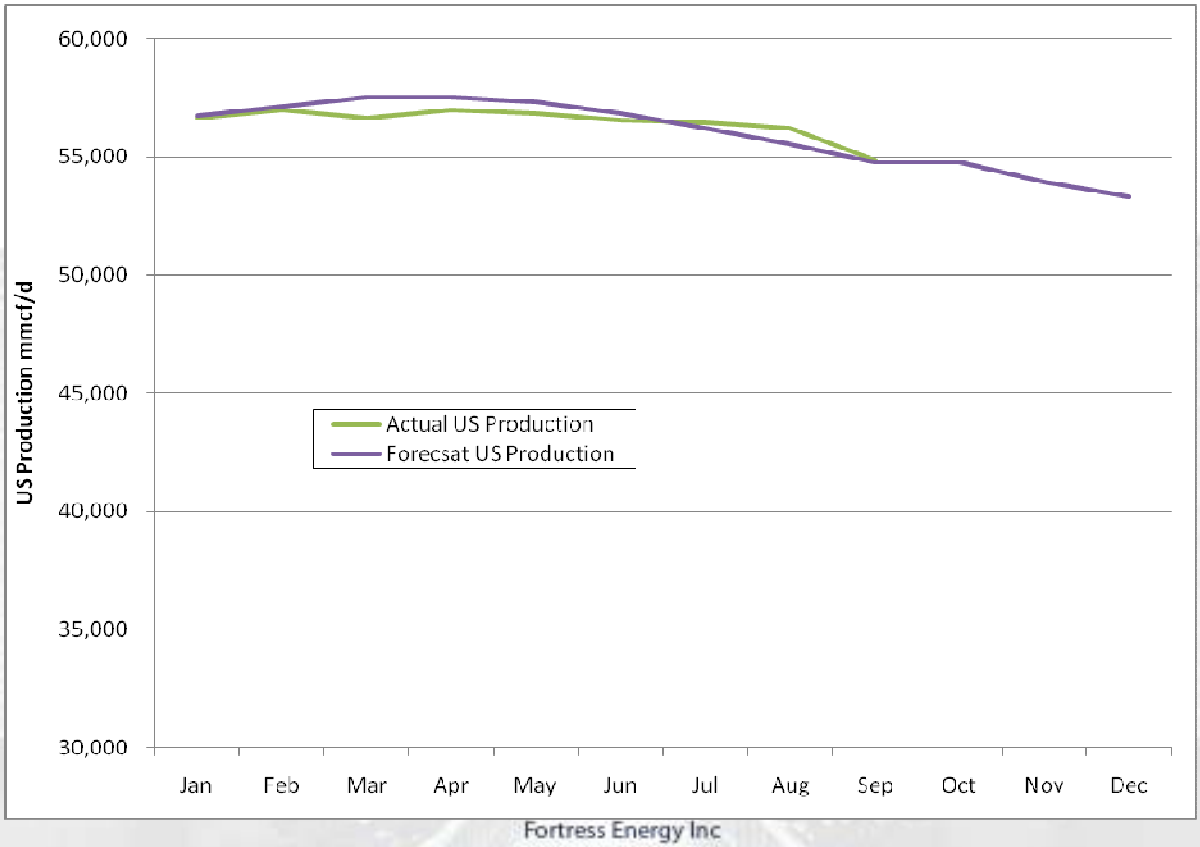
The following are the assumptions I have used to do the math:

1. We know the number of active rigs operating in the US for the past year and we can calculate the number of wells each rig drills. To do this we assume each Horizontal rig to take 35 days to drill a well and each Conventional rig to take 12 days to drill a well.
2. We assume that there is a two month delay of drilling a wells and putting it on stream. Wells drilled in December come on stream the following February.
3. The percentage of Horizontal Well of total gas wells drilled constant at 43% compared to 30% throughout 2008.
4. A Horizontal gas well comes on stream at 3.0mmcf/d and declines at 60% its first year and 36% the second year.
5. A Conventional gas well comes on stream at 300 mcf/d and declines at 43% its first year and 26% the second year.
6. The US production declines by a conservative 26% per annum

It is worth noting that these assumptions are more aggressive than those observed from the 2008 data.

US Natural Gas Production



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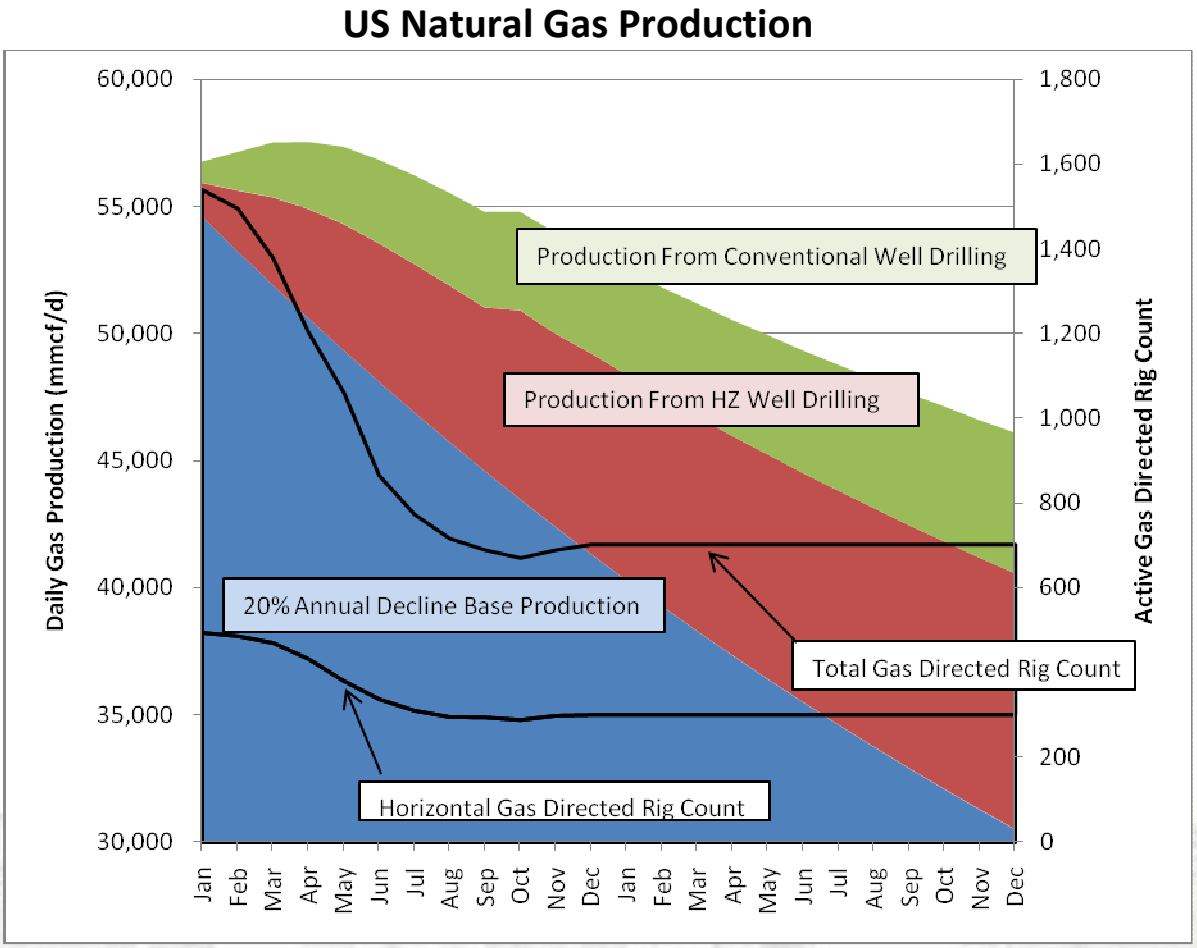
Our model forecasting US Natural Gas production tracks very closely to what has been observed over the year. You may note that there is a very small observed production decline seemingly defying logic.

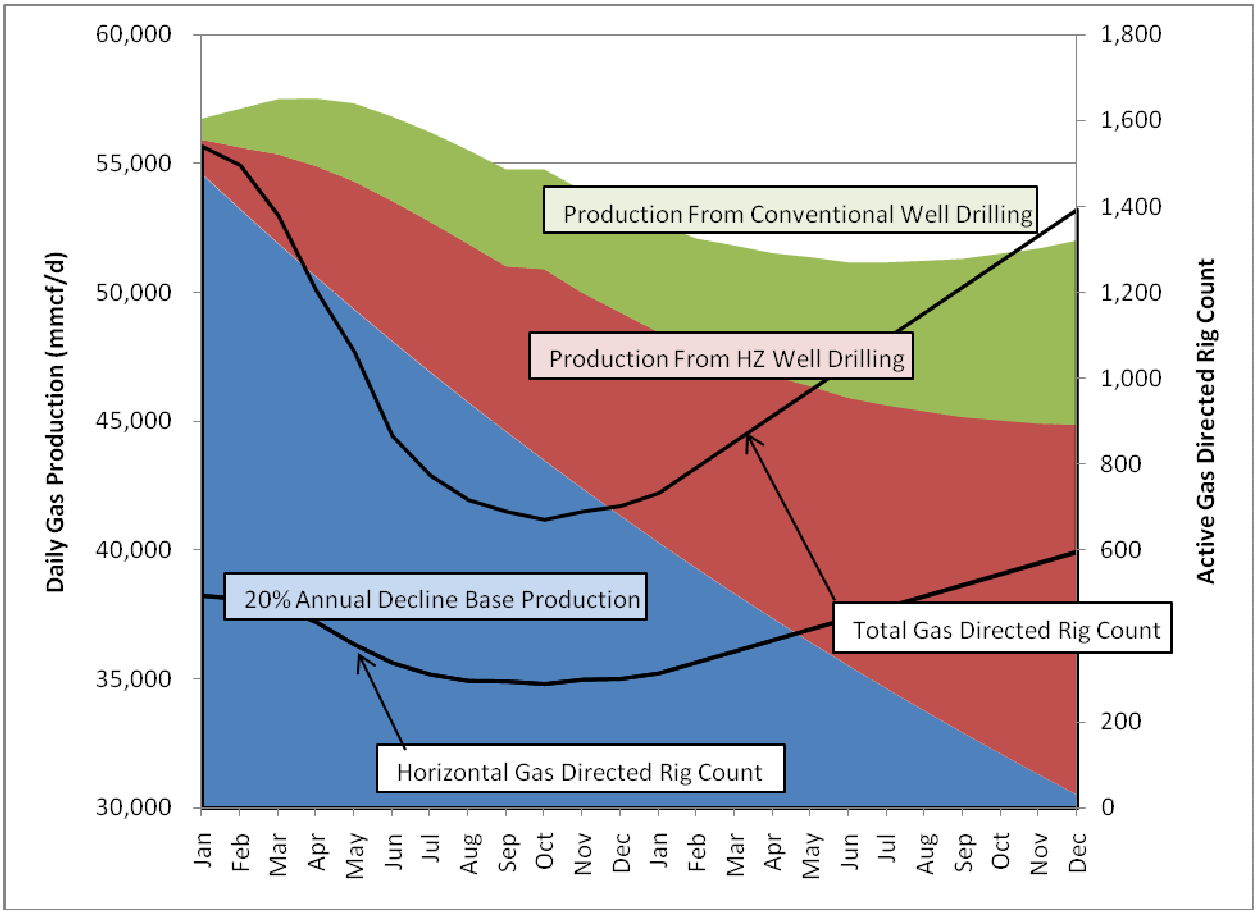
When the model is carried forward it becomes more revealing:



This graph is produced on the same scale but over a two year period and with 700 rigs operating it indicates that US production will fall to 47 bcf/d causing a significant supply deficit. It has taken nine months of falling rig counts to begin to see meaningful production declines and once the decline sets in it become equally as difficult to arrest the trend.

Now let's assume that natural gas prices increase moderately and rigs begin to return to work. In this analysis I have assumed that 60 rigs per month return to work reaching a total of 1,400 by the end of 2010.

US Natural Gas Production



Even with the rig count returning to the robust levels of prior years and a significant portion is directed towards the productive shale gas, US production will fall to 51 bcf/d or possibly more if the base decline rates are truly higher than those used in the analysis.

Conclusion

It is very clear that the pace of drilling activity is the leading indicator to natural gas prices. The excess of gas directed drilling activity created surplus of natural gas in North America but the dramatic decrease in drilling activity will cause surplus supplies to be consumed quickly. The only salvation to the shrinking supplies will be higher prices encouraging operator to return to work.

Cam B.

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