The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

The Marginal BTU - The Return of the Red Queen?

Posted by Nate Hagens on September 27, 2008 - 10:33am
Topic: Supply/Production
Tags: aubrey mcclendon, chesapeake, energy surplus, eroi, natural gas [list all tags]

***Note**: This is an updated version of a post from earlier this week. Some more recent quotes have been added at the end of this post.*

Despite recent optimistic news on new shale gas reserves, the totality of North American natural gas production remains on a treadmill, as the EROI reaper has relentlessly raised the marginal cost of producing- to currently above the price of natural gas futures. While shutting in production is not easy to do once wells are drilled, low prices with rising cost structures can put the crimp on future expansion. Chesapeake (CHK), the largest US natural gas producer and operator of land rigs, announced last evening they will be curtailing production, cutting their rig count and reducing capital expenditures. (Of course, it is possible that this is the first example of an energy production casualty due to the credit crisis if the reason for this capex drop is lack of easy funds...)

In recent years, each time Chesapeake Chairman Aubrey McClendon announces some production or capex decreases, it has marked a bottom in the commodity (see graphic below fold). As this will surely be followed with similar announcements by other E&Ps in the near future (I expect Sanridge Energy and Petrohawk Energy soon), there will soon be a drop in monthly gas production--perhaps as much as 5%.

(Note: Most of TOD:USA is still at ASPO - sincere apologies to everyone I missed at that conference- I will be unable to add comments to this post as I am taking a 7 day hiatus from technology)

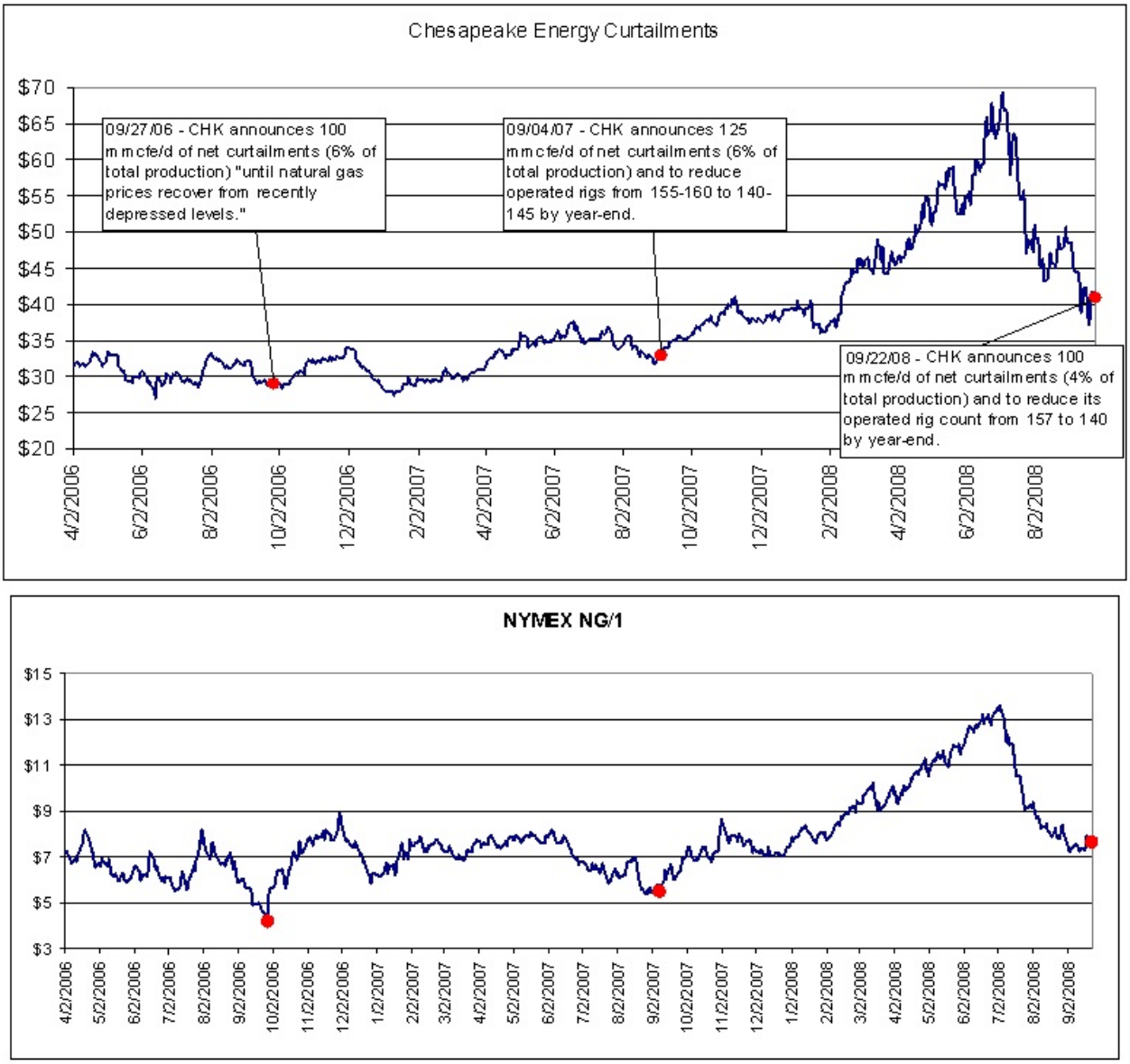
Here are some of the historical oildrum posts on net energy, increasing costs of North American Natural Gas, and the related issues:

An Update on the Energy Return on Canadian Natural Gas
At $100 Oil, What Can the Scientist Say to the Investor?
The Energy Return on Time
Peak Oil - Why Smart Folks Disagree - Part II
Ten Fundamental Truths about Net Energy
The North American Red Queen - Our Natural Gas Treadmill
Energy From Wind - A Discussion of the EROI Research
A Net Energy Parable - Why is EROI Important?
Natural Gas and Complacency

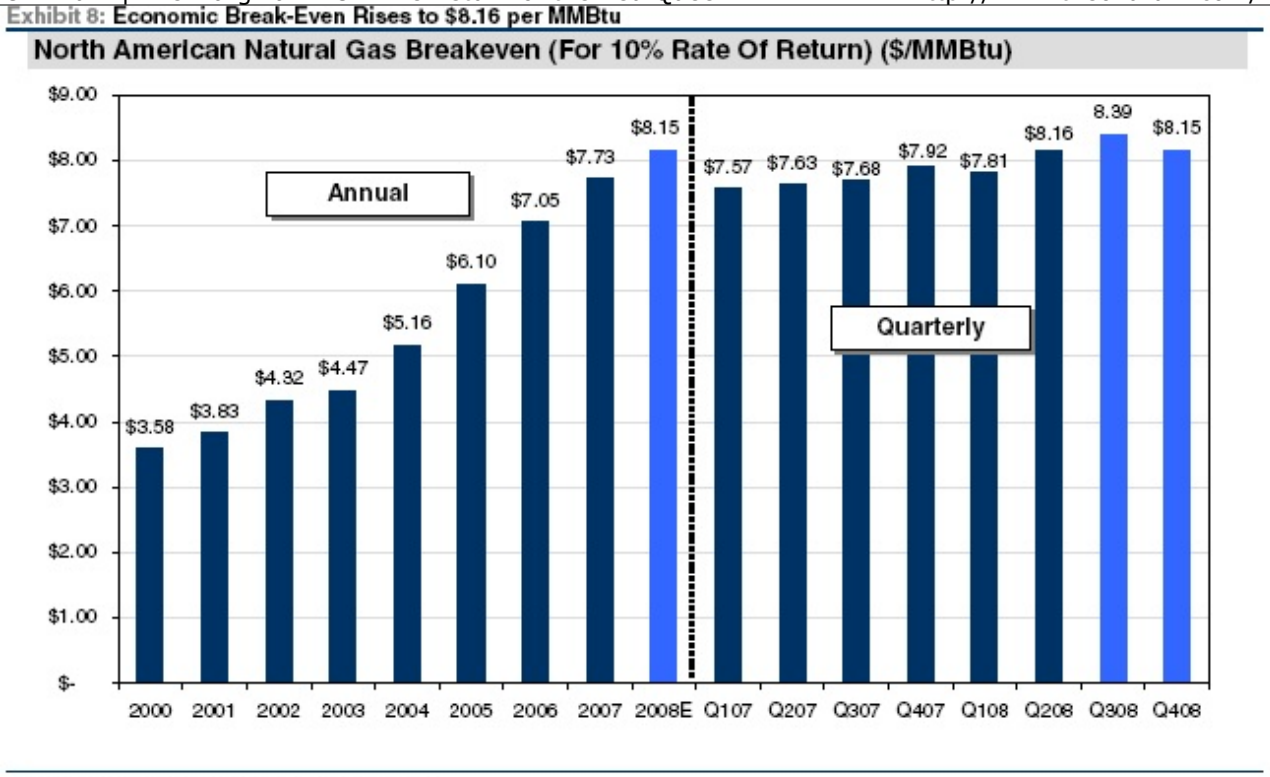
Here are some details from Chesapeakes announcement last night:

> It will temporarily cut production by a net 100 million cubic feet per day in the Mid-Continent, where wellhead prices of $3 to $5 per thousand cubic feet were "substantially below" break-even. That is 4 percent of its total capacity.
>
> "Chesapeake will monitor market conditions and bring curtailed natural gas production volumes back on stream as prices improve," Chief Executive Aubrey McClendon said.
>
> The number of its operated drilling rigs will fall to about 140 rigs by the end of this year from 157 now, and that will stay steady for the next two years, the company said.

Here is a price chart of Chesapeake above a price chart of natural gas, showing the last 2 times CHK reigned in production:



CHK and NG price charts. Red dots indicate capex reductions (Thanks Chris Meeks - Johnson Rice)



Marginal Cost for North American Nat Gas Production (Johnathan Wolff, Credit Suisse Equity Research)

From the Credit Suisse Report (9/8/2008)

> Economic Breakeven Gas Price Rises to $8.16 per MMBtu: We now estimate that the economic breakeven (for a 10% return) NYMEX natural gas price to be in the $8.16 per MMBtu, up from a Q108 estimate of $7.81 per MMBtu (see Exhibit 8). The components of our break even analysis include $3.47 for direct cash costs (lease, operating, production taxes, G&A and interest), a 35% tax rate and $3.00 per Mcfe for D,D&A (versus the industry average $2.49 per Mcfe rate in Q2) reflecting a more "current" cost of adding fully developed reserves. We also "gross up" the NYMEX price needed to get a 10% return by adding a typical industry average basis differential of $0.60 per MMBtu. We then compute the price needed to achieve a 10% after-tax return.
>
> As shown in Exhibit 4, the price needed to get returns has risen dramatically in recent years from about $4.47 in 2003 to $7.05 by 2006 and $8.16 today (and should rise to $8.27 in 2009). Cost inflation has been much more secular than cyclical in our opinion amid an industry shift to poorer reservoirs (i.e. tight gas, shales) that require deeper drilling and complex and long horizontal completions. Likewise, we see a continuation of secular cost inflation (albeit at a slower rate) amid a continued shift to lower quality, deeper reservoirs in the U.S.

Similar proclamations, about costs rising faster than the underlying commodity have been voiced regarding oil as well:

9/12 SAME IRR's AT $100 AS WE USED TO HAVE AT $40-$50 PER BBL
Wood Mackenzie Richard Lines, head of petroleum economics, "Companies are making the same internal rate of return on big, capital intensive projects at $100 a barrel as they were four to five years ago at $40 because costs had risen so dramatically and fiscal terms deteriorated."

9/16 OIL PRICE FALL PUTS PROJECTS AT RISK
CEO of TOTAL "Few projects have been given final investment decisions over the last two to three years because their economics have been so marginal and the overall risks have gone up," adding this would impact the amount of oil supply in the market.

9/17 OIL FIRMS PRODUCING AT A LOSS DUE TO LOW CRUDE PRICES
"For the first time in the history of the Russian oil industry, a remarkable threshold has been achieved — Russian oil producers are transferring everything they get from customers for crude oil exports to the budget," (Moscow Times –UBS Analyst)

In 100 years, we will still have hundreds of billions of barrels of oil underground. The question comes down to cost, which is a function of the merging of technology and depletion. As energy costs rise, dollar costs accelerate until we reach a point where marginal projects (especially in a fragile credit environment) are scrapped. This in turn puts a cap on production, which (assuming demand remains constant) raises price. Aubrey Mclendon's recent strategy is thus consistent with Hotelling Theory, which predicts that as acknowledgement spreads about intermediate and long term scarcity of a commodity, some of it will be saved in situ, to maximize total future rent (e.g. sell 10% less gas, but at 20% higher prices or some such). A critical analysis would be to see how much of total oil and gas is 'fixed' vs 'marginal'. In other words, low EROI reserves that were still being pulled out of small wells in the Gulf of Mexico due to very low marginal costs, became energy sinks after Hurricane Ike necessitated repair/rebuild. The cost *from this point forward* was too high. How much of the oil and gas circulating in the world system was discovered and is being extracted on infrastructure built long ago.....?

What does this all imply for natural gas (and oil) production and prices going forward? What % of production will be rise to 'the marginal BTU' in coming years? What happens as EROI of conventional hydrocarbons approaches unity? For the oil and gas cornucopians out there - how much will it cost to maintain current production for the next decade, let alone increase it?

The Red Queen wants to know.

(UPDATE 9/26: Here are some thoughts from Johnson Rice natural gas analyst Chris Meeks, where Nate got the above CHK/NG charts)

> THE THESIS:
>
> Nat gas is going to rally .... I will tell you how.
>
> THE LOGIC:
>
> Today on my screen the NG/1 price of natural gas is $7.83/mcf. Many people think this is the price E&P companies get for their natural gas. Nothing could be farther from the truth. The table below shows what different Hubs are paying for natural gas this morning. Note that all but the Hubs in the East are well below the NG/1 contract...many are well below. Most notable are the Hubs in the West (Opal, Blanco, and Cheyenne) with an average price of $4.47/mcfe and in Canada where nat gas is currently $6.09/mcf.
>
> Now here is where the rubber meets the road. The prices below are the prices paid to E&P companies for gas delivered to the Hub. E&P companies have to process and transport the natural gas to the Hub in order to realize this posted price. A guesstimate of processing and transportation costs is about $0.50/mcf, or $0.50 below prices quoted at the Hub. Add royalties to the land owner (on average 20%) and production taxes (another 5%) and an operator in the West is probably netting back something like $2.97/mcf for their gas ($4.47 less $0.50 less 20% less 5%). Simply put, with nat gas at current prices they are losing money, and you don't drill new wells if you are losing money. Economics are not much better for operators delivering into other Hubs. Few E&P companies can make money at current nat gas prices with all-in costs (F&D, LOE, G&A, taxes, royalties).
>
> Because nat gas prices are extremely dynamic, many of the larger E&P companies hedge out future production to negate price risk. But, here is the problem: over 40% of the 1,853 rigs currently drilling for nat gas in the US are operated by privately owned, much smaller companies that as a general rule do not hedge out future production. That's 800 rigs. CHK recently announced it is cutting its rig count by 10%; CHK will still operate 140 rigs. They can do this because they have extensive hedges in place above $8 for 2008 and 2009 that make it possible. Other E&P companies both private and public have not hedged and cannot drill through this low price environment. You can take it to the bank: other public companies will cut their rig counts very soon. Private companies do not make announcements that they are cutting rigs, they just do it. With the nat gas prices below I can assure you the private companies will be laying down rigs. THEY SIMPLY WON'T DRILL WELLS TO LOSE MONEY. They will cut capex and curtail production. If these low natural gas prices last much longer, Aubrey's statement that the rig count could go down as many as 400 rigs will come true.

> The production response to a lower rig count is pretty quick. A lower rig count means lower production, which means higher prices. I am a dumb geologist, but I know that. Add to the mix: we have had two hurricanes (which caused more damage than people think in the Gulf) that will take an additional 300 bcf out of the nat gas supply; oil is $100 per barrel (have you seen the storage levels of crude oil, gasoline, and heating oil?); winter is just around the corner, and you have the perfect recipe for a strong rally in nat gas. It is coming...stock market meltdown or not.
>
> Let's get real here. These low [non-Hub] prices are not sustainable. Under the current price scenario the Barnett, Haynesville and a few other smaller trends would be the only economic plays in the US. The US consumes on average about 70 Bcf of nat gas a day. If the Barnett and Haynesville were in full throttle they might produce 15 Bcfpd at peak. That is 5 years out at the earliest. We still need to supply 55 Bcf a day of demand. That gas has to be imported or produced somewhere else in North America. The only way that happens is if gas is priced where E&P companies can make money, and that, my friends, is well above the current price. Nat gas prices are going up. Nat gas prices have to go up.

Update by Gail the Actuary

I talked to Nate and am adding a few perspectives from recent business magazine articles:

One of Chesapeake's problems comes from its hedging activity. According to Business Week:

Oil Producers' Bad Bets

> Producers' attempts to hedge against falling prices are falling victim to the oil market's volatility
>
> Trying to guess whether oil prices, which jumped by as much as 25%, to $130, on Sept. 22, will surge or slump? Don't look to the commodity producers for answers. Even companies pumping oil out of the ground don't have a clue where prices are headed. In this volatile market, several industry players have made ill-timed bets that have wiped out their profits. . .
>
> That's essentially what happened to Chesapeake Energy (CHK), Newfield Exploration (NFX), Noble Energy (NBL), Range Resources (RRC), and others in the latest quarter. As energy prices reached new heights, the companies' core businesses pumped out healthy profits. But those earnings evaporated as a result of their trading operations. "A lot of people got creamed," says industry analyst Stephen Schork.

Another part of its problem comes from its leverage. According to WSJ:

Cash-Rich Oil Firms Snap Up Assets

> The turmoil on Wall Street is reshaping the U.S. oil industry, forcing debt-laden smaller producers to sell assets and creating opportunities for larger, cash-rich companies that

> until recently had been criticized by investors for spending too conservatively. . .
>
> Oil prices, though still high by historical standards, have declined more than 25% from their July peak. Natural-gas prices have fallen even more sharply as rising production has led to fears of a looming glut. And many energy companies have seen their share prices plummet 40% or more from their highs in June or July.
>
> The shift has led to a scramble for cash just when the global financial crisis has made it hardest to come by.
>
> Chesapeake, the U.S.'s largest producer of natural gas by output, Monday said it would cut capital spending by $3 billion, or 17%, through 2010. To help fund its drilling program, the company said it will sell $13 billion of assets during that same period.

According to Oil & Gas Journal, part of the problem is current oversupply of gas, and resulting low price:

Chesapeake Energy slashes drilling budget

> HOUSTON, Sept. 25 -- Chesapeake Energy Corp., the second-largest independent and third-largest overall producer of natural gas in the US, is slashing its drilling capital expenditure budget by $3.2 billion, or 17%, for the second half of 2008 through 2010.
>
> Company officials blamed a 50% drop in gas prices since June and the possibility of an emerging gas surplus in advance of increased demand from the US transportation sector.
>
> "Expect other firms to follow Chesapeake's lead and lay down rigs as well," said analysts in the Houston office of Raymond James & Associates Inc. "We continue to see reduced drilling activity (lower rig count) as necessary to balance the natural gas market. Still, this may lead to the decline in activity about a quarter earlier than we anticipated."

The above article goes on to say that production is expected to continue to rise, even with the reduced rig count:

> Moreover, Raymond James noted, "This does not seem to be a fundamental savior for gas prices since Chesapeake still plans to increase its production by 16% year-over-year despite 11% less rigs."

Forbes' view is similar. Chesapeake is cutting production because of the current oversupply and resulting low price:

Analysts praise company's decision to cut drilling

> Analysts on Tuesday praised Chesapeake Energy Corp.'s decision to reduce drilling for

> natural gas amid concerns of a gas surplus.
>
> Oklahoma City-based Chesapeake Energy (nyse: CHK - news - people), the largest producer of natural gas in the U.S., said Monday that it is cutting its capital budget by $3.2 billion, or 17 percent, from the second half of 2008 through 2010. The company said the move is in response to an approximately 50 percent decrease in natural gas prices since June 30 and concerns about the possibility of a gas surplus in advance of increased demand from the U.S. transportation sector.