

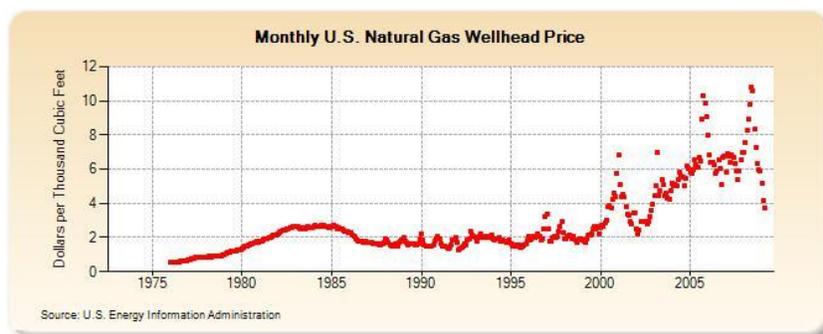
Game changer 3: New natural gas supplies — great for low-cost climate action, bad for coal

June 25, 2009

*There appears to be a lot more natural gas than previously thought (Part 1) and therefore unconventional gas makes the 2020 Waxman-Markey target so damn easy and cheap to meet (Part 2). Our guest blogger, Craig A. Severance, is a practicing CPA in natural gas country — Grand Junction, Colorado. He discusses some of the latest research on new gas supplies and some recent analyses of what that gas might mean for coal use in a post first published on his blog. Craig, is co-author of *The Economics of Nuclear and Coal Power* (Praeger 1976) a former Assistant to the Chairman and to Commerce Counsel, Iowa State Commerce Commission, did one of the most detailed cost analyses publically available on the current generation of nuclear power plants being considered in this country (see “Exclusive analysis: The staggering cost of new nuclear power”).*

The rigs are down. Here in Western Colorado and nationwide, the drilling rigs that employed thousands in well paying jobs are down. Where just a year ago this region was bustling with new drilling activity, rig counts are now down 74%. Across the nation the story is the same: 74% down in W. Texas/NM; 68% down in Green River Basin (WY); 50% down in Arkoma Basin; 49% down in E. Texas/N. La. The gas resources are still there, but new drilling activity is being curtailed.

Local Economy is Hurting. When the rigs go down, so goes the local economy of a gas-producing region. In Western Colorado, \$3.2 – \$3.5 Billion less investment by the natural gas industry is expected in 2009 versus 2008. Housing prices are down and unemployment is rising. Retail sales have fallen drastically, stressing merchants and local governments. The flow of dollars coming from elsewhere into the local economy has dropped off a cliff. When natural gas — a domestic energy resource — goes down, it is not Saudi oil sheiks but American gas workers and the communities where they live that feel the impacts.

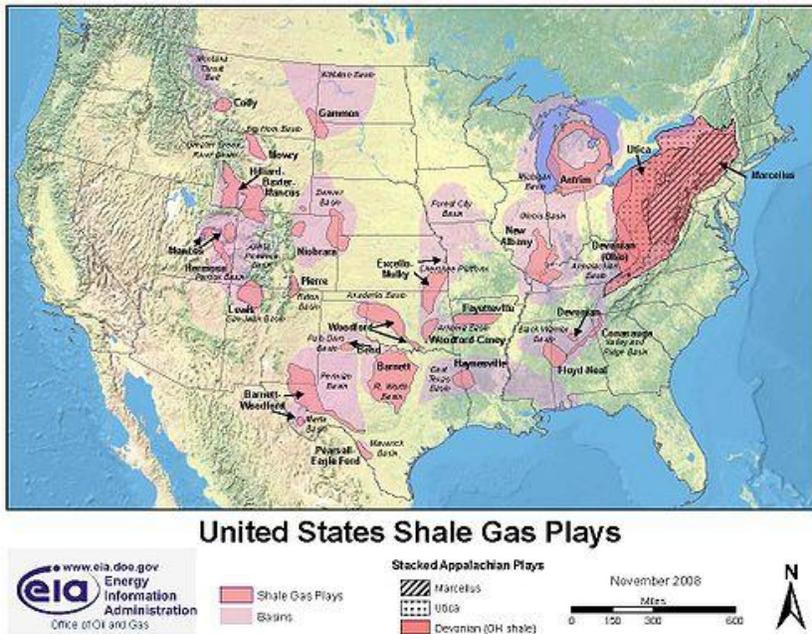


Natural Gas Was High Priced & Unreliable. Just a year ago, in June 2008, the average U.S. wellhead price for natural gas was \$10.82 per thousand cubic feet, (about \$10.50 per Million BTU, or

MMBTU). Electric utilities, concerned about the volatility of natural gas prices and worried about its reliability of supply, were beginning to explore high priced alternatives to natural gas, even considering reviving a nuclear power industry that had been dead for over 30 years.

Then, everything changed almost overnight.

39% Increase in Total U.S. Natural Gas Resources. High natural gas prices, together with relatively new “fracturing” technologies to free gas from shale deposits, prompted massive gas exploration efforts nationwide. These resulted in discoveries of major new natural gas resources, which became apparent before the end of 2008:



On Thursday, the nonprofit Potential Gas Committee industry group, assisted by the Colorado School of Mines, released the results of its [2008 assessment](#), indicating a total increase of U.S. natural gas resources of 39% since its last assessment, for 2006. The report notes the new natural gas resource estimate is the “highest resource evaluation in the Committee’s 44-year history” — indicating the U.S. has far more resources of natural gas than previously considered.

“Furthermore, new and advanced exploration, well drilling and completion technologies are allowing us increasingly better access to domestic gas resources—especially ‘unconventional’ gas—which, not all that long ago, were considered impractical or uneconomical to pursue.” noted Dr. John B. Curtis, Professor of Geology and Geological Engineering at the Colorado School of Mines and Director of the Potential Gas Agency there, which assists the Committee.

“Consequently, our present assessment demonstrates an exceptionally strong and optimistic gas supply picture for the nation.”, Curtis concluded.

Foreign Liquefied Natural Gas Now Entering U.S. at Low Prices.

In an article titled “Who Knew? Looks Like We’re In for an LNG Glut”, the April 2009 issue of *Electricity Journal* noted “In early 2000, the conventional wisdom was that U.S. domestic production capacity was on the decline, requiring massive imports of liquefied natural gas (LNG) from overseas.”

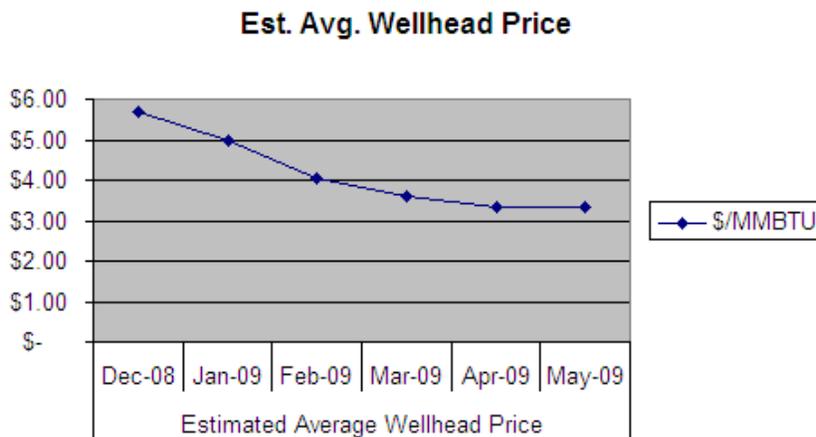
In response to this outlook, a number of major LNG terminals were constructed to import LNG from producing countries overseas, where natural gas is often an unused byproduct of oil production. Those projects are now coming to fruition — at exactly the wrong time for the U.S. natural gas industry.

Electricity Journal noted “there is now broad agreement that a U.S. LNG import surge is coming.” The article noted three new U.S. terminals came online in 2008, after a record-setting LNG import total of 770 billion cubic feet in 2007.

Most distressing for the U.S. natural gas industry is that LNG imports are being sold at incredibly low prices. With a glut of LNG terminal and tanker capacity, foreign producers now have the LNG loaded and ready to sell, and often are merely trying to cover their marginal costs of operation. The article noted “Setting aside the need to recover massive fixed investments, the LNG itself can be sold for as low as \$3 per [MMBTU], including transportation costs”.

“Why would anybody sell LNG at such a low price? Because, as Zach Allen, head of Pan EurAsian Enterprises, says, ‘Some cash is better than none’, especially for low-cost producers such as Qatar or for others where natural gas is a byproduct of extracting oil.”, the *Electricity Journal* article concluded.

Natural Gas Prices Have Crashed. With a new abundance of resources both domestic and foreign now flooding the market, U.S. natural gas prices have crashed.



Price Not High Enough to Support Drilling. While good in the short term for consumers, natural gas prices this low have now largely curtailed new drilling and exploration activities. It is generally accepted that new drilling costs from \$6.00 to \$7.50 per MMBTU, so until prices can rise high enough to cover those costs, the rigs will stay down.

Little Hope On Horizon. Gas producers are looking at a very bleak outlook for 2009 and expect prices to remain depressed until increased demand for natural gas catches up with the very plentiful supplies now available. "The worst is yet to come, '09 activity is down 70-75%", stated Carter Mathies of Arista Midstream Services LLC during his presentation at the Grand Junction, CO Chamber of Commerce last week.

Enter "An Inconvenient Truth" — for COAL. Unexpected help to the natural gas industry may come soon, and just in time, through a "Cap and Trade" bill to limit emissions on carbon dioxide production from electric power plants. This is a major piece of legislation that proposes to change the energy sources we use to generate power – and the outcomes would greatly favor natural gas.

Scientists worldwide have concluded that the raising of carbon dioxide (CO₂) levels in the atmosphere is having severe impacts on our climate. They say fossil fuel emissions must be controlled to prevent flooded coastal cities, dust bowls from Kansas to California, destruction of coral reefs and low-lying island nations, among other catastrophic effects. (See [here](#) for a good summary of the science.)

The major culprit, they say, is the burning of coal to produce electric power. Our nation's top climate scientist, NASA's Dr. James Hansen, argues "**coal is the single greatest threat to civilization and all life on our planet**". (See Hansen's full remarks [here](#).)

Natural Gas is Winner When CO₂ is Regulated. While natural gas is also a fossil fuel and produces carbon dioxide when it is burned — it has a major advantage over coal. ***The best natural gas power plants produce less than half as much carbon dioxide per kWh of electricity as coal fired power plants.***

Natural gas combined cycle gas turbines (CCGT's) are very efficient because they use two cycles to recover heat (hence the name "combined cycle"). These gas turbines are also far less costly to build than a new coal fired power plant.

Cap and Trade is Emissions Regulation, NOT a "Carbon Tax". If the Waxman-Markey Climate and Energy legislation before Congress actually contained a carbon tax, such a sledgehammer method might adversely affect the natural gas industry. Natural gas is a carbon based fuel.

However, no such taxes are imposed by the legislation. (That's why propaganda against the bill always uses "tax" — in quotation marks — since there really is no tax.)

Instead, **the bill sets emissions limits** on the amount of CO₂ that can be released to the atmosphere. This is very similar to other pollution limits that have existed for decades on power plants and factories. The emissions limit is the "Cap" part. The "Trade" part lets a utility continue to emit if it pays someone else to reduce *their* emissions — this is so the cheapest methods can be used.

It is widely accepted that CO₂ emissions limits will cause utilities to switch from burning coal, to instead burn more natural gas. One of the simplest ways a utility can reduce its CO₂ emissions is to use less coal and instead use a natural gas plant that produces less than half as much CO₂.

New Coal Plants Will Instead Be New Natural Gas Power Plants. If the Cap and Trade bill passes and carbon dioxide emissions are regulated, it is widely expected utilities will completely stop building any new coal-fired power plants, unless they have some device to "capture and sequester" the carbon dioxide produced by burning coal. Carbon dioxide "capture and sequestration" for coal plants isn't proven yet, and will be very costly even if it works, so at least for a few decades, no new coal plants are likely to be built.

If instead of a coal fired power plant, the utility builds a natural gas power plant, it will automatically reduce possible CO₂ emissions by half. Nuclear power plants won't be built because they are [too costly](#) — especially when compared with a natural gas plant.

Existing Coal Plants Will Be Phased Out. When continuing to operate a utility's existing coal plants becomes too expensive because of CO₂ emissions limits, the older coal plants will begin to be phased out.

An immediately available partial phase out of coal — and hence greater use of natural gas — will likely be seasonal "fuel switching" to utilize natural gas power plants more at times of the year when it is feasible to temporarily shut down some of the smaller coal plants.

As carbon dioxide emissions limits tighten in future decades, utilities will begin to permanently retire their coal fired power plants. In the June 2009 issue of *Public Utilities Fortnightly*, Steven Fine and Elliott Roseman note "As CO₂ prices rise, existing coal plants become less attractive to operate. Specifically, above about \$30/ton for CO₂, with natural gas prices of \$7 to \$8/MMBTU, coal's competitiveness in the dispatch order drops dramatically." Fine and Roseman project that if \$80/ton-of-CO₂ prices are in effect by 2030, "production from existing coal plants in 2030 would fall off the cliff by 85 percent". Their analysis is specifically tied to natural gas, as natural gas would provide much of the electricity generation no longer provided by burning coal.

[JR: Note: Actually, at \$7 to \$15/ton of CO₂, coal should lose in the dispatch order in the Southeast and Atlantic regions as a May EIA analysis showed (see [here](#)).]

Wind and Solar Work Best With Natural Gas. Over the next few decades utilities and their customers will build hundreds of thousands of MegaWatts of renewable energy electricity such as [wind farms](#), [solar photovoltaic panels](#), and [solar thermal power plants](#).

The Cap and Trade bill will strongly move utilities in the direction of using these “free power” sources, as they have zero carbon dioxide emissions.

While the “Zero CO₂” of renewables is better than the “Half the CO₂” of natural gas plants, this is not bad news for natural gas.

Natural gas power plants are load-following power plants, which can shut down when the solar or wind resources are available. This is not true for nuclear or coal power plants, which are designed to run all the time. Thus, an electric grid comprised more heavily of natural gas load-following power plants is capable of adding a higher proportion of electricity generated by the wind and the sun.

On the supply side, the ability of natural gas power plants to ramp up quickly to provide power when needed — e.g. when the wind is *not* blowing — make them an essential part of an electric grid that uses a high percentage of renewable energy.