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Natural Gas Crisis

by Dale Allen Pfeiffer

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June 23, 2003, 2000 PDT (FTW) --Forget about terrorists. Don't give another thought to SARS. The single greatest threat to the U.S. right now comes from a critical shortage of natural gas. The impending crisis will affect all consumers directly in the pocket book, and it may well mean that some people won't survive next winter. The problem is not with wells or pumps. The problem is that North America is running out and there is no replacement supply.

Natural gas stocks are currently at 1,199 billion cubic feet (Bcf), over 39% short of what they were last year at this time (1,954 Bcf). The storage refill season has so far proceeded at a very modest pace, though buyers recently pushed up their purchases to record levels.¹ The peak storage refill period runs from May through mid-July. By late July, summer electricity demand usually limits the amount of natural gas available for storage. Weekly storage levels tend to taper off through the summer, rise again slightly in September, and then drop to nothing as the winter heating season starts up in October. There is very little time left to replace the record withdrawals that occurred this last winter, and the peak refill season is nearly over. What is more, analysts are saying that we need to do more than just replace what was used last winter. In order to avoid a crisis next winter, we must build our storage up to record levels.

Let's take a look at the Natural Gas (NG) situation in an effort to understand what is happening. And then let's lay in an extra load of firewood for that woodstove, and see about double insulating the household before next winter.

Review

Even though oil and gas are almost always found in the same places and originate from the same organic matter, let's remind ourselves that Natural Gas is different from oil by nature. Being a gas as opposed to a liquid, once a well is drilled it takes relatively little effort to pump out the gas. There is little tapering off in production, little need to expend more energy driving the gas to the well hole. Natural Gas production profiles generally have a rise, a plateau, and then a steep cliff with little warning as the pressure in the well drops and the play peters out. Likewise, NG reserves are much more responsive to drilling than are oil reserves. The more wells you sink into a gas reserve, the more NG you will extract, and the quicker you will deplete the reserve.

We must also bear in mind that, while the world as a whole is nowhere near peaking in NG production, the same is not true for North America. There may be massive known

reserves of NG still untapped around the globe (especially in Russia), but that does us little good here. This is because NG is not easily transported overseas. First it must be chilled to liquid form in special processing plants, loaded onto specially built Liquid Natural Gas (LNG) tankers, shipped to specially designed offloading ports, and then reverted back to gaseous form.

All of this cuts into the net energy of LNG and adds to the price. And the amount of LNG that can be shipped in this manner is limited by the size and number of tankers and the length of time for one full trip (from the Middle East to the US and back, with loading and unloading, up to half a year per tanker according to some sources).

The US has few LNG tankers and still fewer offloading ports, though there are plans to build more. It is unlikely that we will ever meet a significant portion of our NG demand through the use of LNG.

Over the past several years, US electricity producers have looked increasingly to Natural Gas as the cleanest way to produce electricity. Between electricity generation, heating demand and industrial demand, our NG usage has grown remarkably. And demand is continuing to grow. The power sector alone will account for most of this growth; it is expected to add another 2.5-3.0 Trillion Cubic Feet (Tcf) to the national demand between now and the end of the decade.²

The California gas crisis of 2000-2001 was a largely manufactured crisis due to greed in the privatized market. Energy sharks were able to magnify a slight NG deficit into a full-blown crisis through manipulation of the market and manipulation of regional NG supply. This was the fruit of deregulation.

Unfortunately, the criminal activities of the California energy sharks have tainted our view of the NG situation. Now, whenever a shortage causes NG prices to rise, people tend to think the situation is manufactured and manipulated by the industry. And NG suppliers have tried beyond reason to keep prices down and the supply up, least they be tainted by the memory of the California fiasco. Therefore, NG production in 2002 was allowed to slide down to a paltry level, and NG storage was unprepared for the drawdown that occurred last winter.

The Current Picture

Winter demand in 2002-2003 hit an all-time high, depleting storage by a record 2550 Bcf. By early April, storage had bottomed out at a dangerously low 623 Bcf, more than 40% below normal storage for that time of year. Spot prices skyrocketed to \$10.00 per Million British Thermal Units (MMbtu's). This led to NG prices of as high as \$30 per million cubic feet (Mcf).

The American Chemistry Council has calculated that this is equivalent to paying \$16 for a gallon of milk, more than \$9 for a gallon of gas, or nearly \$13 for a pound of beef.³

Prices dropped slightly following the end of the winter heating season. However, in the last few weeks, prices have begun to rebound due to increasing storage injection demand---sending spot prices to over \$6.00/MMbtu as of June 4th.⁴ Prices are likely to continue increasing, as the power industry desperately seeks to rebuild its reserves through the summer. Competition with summer electricity demand could send prices back

to their late winter highs.

Effects on Industry & Agriculture

One of the first effects of the soaring NG prices was a drop in industrial use, along with fuel-switching, wherever permits and technological capability allowed. Most of those industrial facilities and generators that did switch over to petroleum distillate have not switched back, because NG at its lowest price this spring was double the cost of distillate. This is likely to lead to complications.⁵

The American Chemistry Council, along with other industry lobbying groups, began to clamor immediately for the US to increase domestic NG production as well as imports. The US chemical industry uses 11% of all the natural gas consumed in the United States as feedstock and to run its plants. In May, Bayer Corporation led a major effort to urge Congress and the White House to lift restrictions on NG production in the Gulf of Mexico and the Outer Continental Shelf. They also called for increased imports from Canada.⁶ Partially as a result of these efforts, Ambassador Paul Cellucci has been pressuring Canada to streamline its regulations and step up exports of both NG and oil to the US.⁷ To do this, Canada would likely have to cut its own domestic usage, because Canadian production of NG is declining. Canadian analysts expect that net exports to the US will be reduced by 5% this year.⁸

Rising NG prices have also led to an increase in Nitrogen fertilizer costs, which use NG as a feedstock. Nitrogen fertilizer is now selling for in excess of 55% more than it sold for a year ago. Natural Gas accounts for 70 to 80% of the cost of such fertilizers. Southern farmers also face higher irrigation expenses, as NG is used to run irrigation pumps. Food processors do not expect to pass these increased costs on to consumers; in fact, they do not expect to absorb the extra costs themselves. They expect farmers to eat the extra cost.⁹

Nitrogen fertilizer facilities are feeling the pinch. Just recently, Unocal warned Agrium Inc. of possible further cuts in NG supply to Agrium's Kenai, Alaska nitrogen facility. Agrium is a leading global producer of agricultural nutrients.¹⁰ This news indicates that Alaskan NG production is declining. Elsewhere, fertilizer plants have been shutting down. Most recently, PCS Nitrogen announced it was shutting down its Millington Tennessee plant indefinitely due to the price of NG.¹¹

And then there is the effect on Canadian oil sands mining, which is powered by NG. While none of the players have actually said so, it is difficult to believe that rising NG prices have not played a role in shelving oil sands projects. Petro-Canada was the latest corporation to announce a suspension of oil sands activity, placing on hold its multi-billion dollar oil sands strategy. Suncor, Shell and Syncrude are all trying to manage multi-billion dollar overruns for their own tar sands operations. Analysts for Rigzone warn that spiraling oil sands construction costs are the biggest threat to US energy security.¹²

Natural Gas is also the feedstock for hydrogen production. As NG prices are expected to remain high for the next several years, one cannot help but wonder what impact this will have upon the hydrogen economy fantasy.

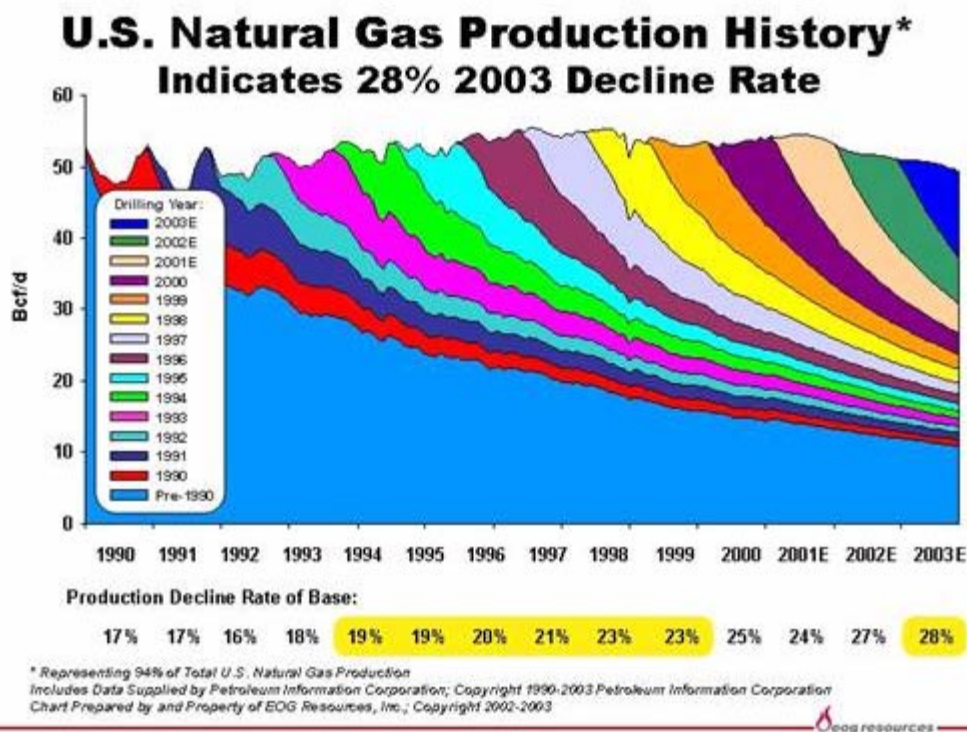
(As a side note, recently there was another incident of a hydrogen tanker catching fire.

The compressed hydrogen gas inside the tanker shot a flame 60 feet into the air until it burned itself out. It is believed that the fire was caused by a failure in the mechanism that controls the flow of gas out of the tank.¹³⁾

Government Response & the Example of Ladyfern

Energy Secretary Spencer Abraham has summoned energy industry leaders to an emergency June summit to discuss the NG situation.¹⁴ It is likely that this summit will result in a call to roll back environmental regulations on government-controlled lands and offshore areas. It is also likely that the summit will result in a bargain sale of NG drilling rights on public lands.

Beyond this handout, the Department of Energy (DOE) believes that market forces will resolve the NG dilemma. The agency believes that higher NG prices will result in increased profits for operators, who will in turn have more money to spend drilling NG wells.¹⁵ The DOE does not realize that the industry is currently running simply to stand still. US production history shows that new wells are being depleted more quickly all the time; the current decline rate is 28%. While this is partially due to growing demand, it is also due to the fact that the large plays of NG are all aging and are in terminal decline. Newer plays tend to be smaller and are produced (and depleted) quickly in the effort to maintain overall production levels.



Once again, economists fail to recognize that throwing more money into production will not solve the problem if a non-renewable resource base is depleted.

Another myth supported by the DOE as well as many industry insiders is that the price of NG cannot rise above the equivalent price of oil for any sustained period of time---the logic being that users will switch from NG to petroleum distillate until NG prices settle

back down. This may have been true in the past, but it does not hold true for today's market. In the current market, most opportunities for fuel-switching have already been taken, as mentioned above. NG is currently priced over twice as high as distillate per MMBtu.¹⁶ In such a market, no one in their right mind would continue to burn NG if they had the capacity to switch.

Analysts claim that between industry and the energy-generating sector there is at least 6.5 Bcf/day of remaining potential for fuel switching. These claims are simply based on a count of facilities that are dual-fuel permitted. Many of these dual-permitted plants are now no longer capable of burning oil, though they retain the dual-fuel permit. Others cannot burn oil during the ozone season. Many other combined-cycle units are dual-permitted while still lacking the burners required to burn fuel oil. There are a number of reasons why a count of dual-fuel permits is not an accurate assessment of fuel switching potential. It is likely that the remaining fuel switching potential is half of the amount analysts claim.¹⁷

Moreover, inventories of oil products in the US are at low levels right now. Inventories of distillate are particularly low because, in recent months, refineries have been converting substantial amounts of distillate into gasoline. Due to increased demand, these inventories are not expected to be replenished any time soon. As a result, we simply don't have the physical supply of distillate to allow for large scale switching.

There are many additional factors limiting the amount of fuel switching that may occur. At prices below \$10.00/MMBtu, it is unlikely that remaining fuel switching will exceed 1.0-1.5 Bcf/day. This would only free up an additional 175-250 Bcf of NG for injection into storage between now and late October.

Should NG price hikes result in a drilling frenzy, the result would probably resemble what happened to the Ladyfern deposit in Northern British Columbia. Discovered in 1999, Ladyfern was considered the largest NG discovery in North America. At one time, Ladyfern was thought to contain over one trillion cubic feet of NG, but experience has cut that number to less than half. Ladyfern was also expected to make up fully one quarter of Canada's NG production for some time to come.

What happened? From a withdrawal rate of 785 Mcf/day the play has now dwindled to 300 Mcf, and will quickly be reduced to a trickle. Only a year ago, this area of British Columbia resembled a gold rush, as NG riggers, helicopters, service crews, and road and pipeline construction crews stampeded the muskeg. Roads that carried 1,000 service vehicles per day one year ago are now lucky to see two dozen trucks.¹⁸

What happened to Ladyfern was a result of unbridled, unregulated greed. Government mismanagement allowed competing corporations to overproduce the play, and draw it dry in a fraction of the time that it should have taken. As a result, there are numerous wells dotting the muskeg of British Columbia that are sucking water, and the people of British Columbia are being cheated out of much-needed revenue. Companies that would have made 200% on their investment if properly managed have had to settle for a 20% return. And the overproduction and speedy depletion of Ladyfern has contributed to Canada's falling NG production and the rising NG prices of these past several months.¹⁹

Will the DOE learn from Ladyfern as it seeks to roll back regulations in an effort to spur NG production? Will the NG industry remember the lesson of Ladyfern as they are drawn

by the lure of skyrocketing NG prices? As NG production continues to diminish in North America, rising NG prices and rising NG demand could result in the overproduction of other plays.

The Current Storage Refill Season

The NG storage injection season normally runs from April to late October. But the majority of the refill occurs between late April and the middle of July---the period after the end of the winter heating season, but before the summer cooling season increases electricity demand. This means there are only a few weeks remaining in the peak refill season. And as time goes by, it becomes increasingly difficult to make up for deficits from previous weeks. Until the week ending May 30th, weekly injection rates remained low. Part of the reason for this was the need for local distribution companies to obtain permits to allow them to change their purchasing habits. These permits have now been obtained and the local distribution companies are beginning to boost their purchasing orders.

By the second week in July, NG storage injection will be in competition with the summer cooling season. This year, electricity demand will rely increasingly on NG. Much of this reliance on NG will be due to new limits on NOx (Nitrous oxide) emissions taking effect this year. From May 1st to Sept. 30th, Northeastern utilities will be required to cut NOx emissions (NOx is a precursor to urban smog) by 1/3 from the level of NOx emissions of the same time period last year. To meet this cap, coal-burning utilities will find it necessary to cut back on coal use and substitute cleaner burning gas-fired generator units.²⁰

To complicate matters, extended summer shutdowns at nuclear power plants will further increase the electricity generating demand on Natural Gas. Degraded reactor vessel heads threaten to sideline many Nuclear reactors during the summer. Nuclear reactors currently generate about 10% of the nation's electricity.²¹

Add a hot summer onto this, and in short order, we could see NG prices return to the \$8.00-\$10.00 range experienced last winter.

Supply, Demand & the Ideal Storage Goal

This winter saw a record 2,549 Bcf withdrawal from storage. Most analysts claim this was due to the cold winter. But even before the winter heating season had started, storage had fallen by more than 500 Bcf relative to the five year average.²² So we began the winter season in a very precarious position.

While the Eastern United States did experience a long and bitter cold spell in January and February, the winter was actually slightly milder than usual for the winter heating season as a whole. As measured in gas-weighted Heating Degree Days, the weather was 3% milder than historical norms. While severe cold weather in January and February did contribute to the NG withdrawal rates, in the coldest week of the winter the increase in NG consumption attributable to weather was less than 30 Bcf. Even after normalizing the data for weather, withdrawal from storage for the winter season was 843 Bcf greater than expected.²³ Why this enormous withdrawal?

The answer is that demand for NG has been increasing over the past several years beyond the Energy Information Administration's assessments for necessary storage.

Meanwhile, NG production in the United States and Canada has fallen off the cliff. The only reason why this cliff has not become readily apparent is that the NG industry has been bringing new fields online in a frantic effort to keep production levels from dropping too rapidly. Unfortunately, very few of the new plays have high production levels, and most of them play out very quickly. In effect, NG production is running faster and faster in an effort simply to stay in place, while demand is leaving it far behind.

Analysts estimate that we need a minimum storage level of 3,450 Bcf by the beginning of winter to ensure the public safety. Even at this level, price spikes are likely to occur. An ideal working reserve to insure public safety and a healthy economy would be in the range of 3,550 to 3,850 Bcf. The United States has a total storage capacity of 3,450 Bcf, right at the minimum storage level needed. The ideal working level is 100 to 400 Bcf above capacity.²⁴

Last year storage peaked at 3,172 Bcf on October 10th. By April 11th, storage was down to a record low of 623 Bcf.²⁵ Current storage is at 1,199 Bcf--less than 38% of last year's peak.²⁶ Simply to reach a minimum storage level of 3,450 Bcf will require injection levels of 130 Bcf per week for the next 10 weeks.²⁷ The May 30th injection rate was a record 114 Bcf, still a far cry from 130 Bcf.²⁸

The year 2001 saw a record injection season, with injection rates over 100 Bcf for 8 out of 10 weeks between May 2nd and mid-July. Beginning from our low of 623 Bcf, if we match the 2001 injection season, we will face winter with a storage total of 2,919 Bcf-250 Bcf below last year's end of season storage level. Analysts say it may be impossible to reach a safe storage level at this point in the season.²⁹

The Natural Gas Crisis

It is almost a certainty that there will be a Natural Gas crisis this year, and you will not have to wait until winter to see it begin. Prices are already beginning to move upward. By the end of August NG prices will probably be back in the \$8.00-\$10.00/MMbtu range, and possibly higher. Such prices for summer are unheard of, and there is no telling how it will affect the market, or our electric bills.

This will be the beginning of the crisis. But it will grow worse as we go into winter. How bad it becomes depends on how much NG has been injected into storage by the beginning of winter. If storage injections over the next several weeks continue at the same pace as this past week (114 Bcf) but remain 15 to 20 Bcf below the 130 Bcf/week needed to reach minimum levels of storage, then we will likely see a repeat of last winter, with NG prices soaring in the second half of the season.

If storage injections over the next several weeks fall back below the 102.1 Bcf injection levels of 2001, then this coming winter will likely be worse than last year. At this rate, we will enter the winter heating season at dangerously low levels. Public safety could be endangered.

If storage injections over the next several weeks drop back down to the 77.7 Bcf/week level achieved last year, then we will see a crisis of overwhelming magnitude. In such a case, it would be wise for the Bush administration to develop an emergency program to build storage during the remainder of the injection season, and to nationally ration NG for

both electrical use and for home heating.³⁰

And now let's talk about the weather. A mild summer and a mild winter would be a blessing. Mild weather for the entire year would not necessarily prevent price runups or the depletion of storage, but it would ease the sense of emergency. On the other hand, a hot summer and/or a cold winter would worsen the crisis. A hot summer would increase electricity demand for cooling, making it more difficult to meet storage injection goals. A severe winter could create a national energy emergency such as we have never seen before. With storage below minimum and a severe winter, it is not impossible that we could completely deplete storage.

In the worst case, there would be many stories of people freezing in their homes. Prices would skyrocket. The chemical and fertilizer industry would be sent reeling. Overall, industry would slow down drastically and the economy would suffer. Come the summer of 2004, farmers would go out of business and the price of food would likely begin to climb. And the task of refilling storage in 2004 would be even more daunting than it is this year.

For now, we can hope for mild weather, watch the weekly injection rates, and consider adding in an extra supply of wood for the fireplace or double insulating our homes. It may be time to look at investing in passive solar heating for the home.

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³ **Bayer Calls For Reliable Supply Of Natural Gas In North America.** CNN Matthews, 5/1/2003. <http://hsweb01.screamingmedia.com/PMA/pma_newsarticle1_national.htm?SMDOCID=comtex_2003_05_01_cc_0000-2200-KEYWORD.Missing&SMContentSet=0>

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⁵ Ibid.

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¹⁷ Ibid.

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²¹ **US nuclear power snags may drain oil/natgas supply.** Planet Ark, 5/7/2003. <<http://www.planetark.org/dailynewsstory.cfm/newsid/20699/story.htm>>

²² Op. Cit. See note 2.

²³ Ibid.

²⁴ Ibid.

²⁵ Ibid.

²⁶ Op. Cit. See note 1.

²⁷ Op. Cit. See note 16.

²⁸ Op. Cit. See note 1.

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³⁰ Ibid.

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