

US NATURAL GAS INVENTORY BUILDING: THE PRODUCING REGION PICTURE

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In the movie “The Producers”, Max Bialystock declares: “I want that money!” (Mel Brooks, director)

CONCLUSION

When United States natural gas 2014 build season ends this autumn, assuming normal weather and moderate US economic growth, working gas inventories in the key Producing Region probably will be between 1030bcf/1056bcf and 1170bcf. Suppose US gas output over the next several months significantly exceeds the Energy Information Administration’s May 2014 forecast (as some natural gas clairvoyants claim it will). Then inventories may ascend from the EIA’s current estimate of over 1020bcf to around 1170bcf. Based upon historic inventory patterns, especially those of 2006 to the present, most marketplace participants probably view around 1173bcf as average Producing Region inventory for the end of build season. Historical analysis indicates that a move to around 1232bcf, though unlikely, should not be discounted. In any event, the Producing Region probably will not face containment problems this year.

The NYMEX natural gas marketplace during the course of build season probably will remain in a sideways trend, with the range being 3.80/4.00 to 5.00/5.20 (nearest futures continuation). The spring 2013 top (5/1/13 at 4.444) represents a midpoint to monitor. Despite the bearish price drop since late February 2014, the current Producing Region and overall US inventory picture for the balance of build season still appears quite bullish. What happens if as build season marches onward, actual overall US inventories look unable to increase significantly relative to the EIA’s May 2014 prediction for end build season 2014? Then a breakout above 5.00/5.20 resistance is probable. Suppose Producing Region inventory looked headed toward around 1230bcf, and that a comparable large percentage inventory gain also appeared likely in the Eastern and Western regions. Then a price move toward 3.40 may occur.

US NATURAL GAS PRODUCING REGION INVENTORY: BUILD SEASON 1994-2013

It is challenging to define what currently is (and was previously) an “average” (“normal”, “typical”, “desirable”; “high”, “low”) inventory level or range for any given time of year, whether in arithmetic or days coverage terms.

The following table displays US Producing Region (“PR”) seasonal builds for the past 20 years from the end winter draw season floor to the given calendar year’s autumn ceiling (EIA weekly historical data). Each column highlights its low and high over 1994-2013. The table lists many noteworthy price bottoms and peaks for NYMEX natural gas (nearest futures continuation).

<u>Year</u> <u>(start date)</u>	<u>Inventory</u> <u>Low</u> <u>(bcf)</u>	<u>Inventory</u> <u>Peak</u> <u>(bcf; date)</u>	<u>Inventory</u> <u>Change</u> <u>(arithmetic)</u>	<u>Inventory</u> <u>Change</u> <u>(percent)</u>	<u>Natural Gas:</u> <u>Key Price</u> <u>Low/High</u> <u>(date)</u>
1994 (3/11)	271	801 (11/18)	530	195.6	
1995 (3/10)	387	768 (11/3)	381	98.4	372 (12/21/95)
1996 (4/12)	186	642 (11/1)	456	245.2	174 (9/5/96) 460 (12/20/96)
1997 (2/28)	249	712 (11/7)	463	185.9	385 (10/28/97)

Year (start date)	Inventory Low (bcf)	Inventory Peak (bcf; date)	Inventory Change (arithmetic)	Inventory Change (percent)	Natural Gas: Key Price Low/High (date)
1998 (3/20)	332	915 (11/6)	583	175.6	161 (8/27/98)
1999 (3/26)	526	864 (10/22)	338	64.3	208 (11/24/99)
2000 (4/14)	374	679 (11/10)	305	81.6	1010 (12/27/00)
2001 (3/30)	233	933 (12/14)	700	300.4	176 (9/26/01)
2002 (3/29)	546	889 (10/25)	343	62.8	264 (8/7/02) 1190 (2/25/03)
2003 (4/11)	198	904 (11/7)	706	356.6	439 (9/22/03)/ 763 (1/9/04)
2004 (3/12)	371	968 (11/12)	597	160.9	452 (9/16/04)/ 920 (10/28/04)
2005 (3/25)	486	897 (11/18)	401	82.5	1578 (12/13/05)
2006 (3/24)	615	1015 (11/10)	400	65.0	405 (9/27/06)/ 905 (11/30/06)
2007 (3/9)	564	1074 (11/23)	510	90.4	519 (8/27/07)
2008 (3/14)	490	974 (11/14)	484	98.8	1369 (7/2/08)
2009 (3/6)	690	1219 (11/27)	529	76.7	241 (9/4/09) 611 (1/7/10)
2010 (3/5)	548	1254 (11/26)	706	128.8	321 (10/27/10)
2011 (2/18)	687	1261 (11/25)	574	83.6	498 (6/9/11)
2012 (3/9)	965	1287 (11/9)	322	33.4	190 (4/19/12)
2013 (4/5)	690	1297 (11/8)	607	88.0	649 (2/24/14)
AVERAGE 1994-2013	471bcf	968bcf	497bcf	105.5pc	

The average date for the PR working gas inventory bottom at end winter is approximately March 19. Build season plateau arrives around November 13. Over the nearly 240 days from 3/19 to 11/13, the average weekly build runs about 14 to 15bcf. Within build season in general, as well as during any given calendar year in particular, actual inventory increases of course do not occur in the same weekly quantity. Also, sometimes the PR has had a week-to-week draw, as during the post-early August time frame.

The 105.5 percent average inventory increase derives from 497bcf/471bcf. The average percent calculated for the 20 individual periods added together and divided by 20 is 133.7pc.

What about the starting gate for the 2014 season? At its 3/28/14 trough, Producing Region working gas inventory was 352bcf, about 25.3pc beneath the 1994-2013 long run average. This was a moderately late date for the inventory low. The PR's 5/9/14 inventory is 484bcf.

Yet underscore that overall US natural gas demand marched upward from calendar 2006's consumption low of 59.4bcf/day (2000 was 63.8bcf/d). In 2010, demand reached 66.0bcf/d, with 2011 at 67.1bcf/d and 2012 at 69.8bcf/d. The EIA places calendar 2013 demand at 71.3bcf/d. It predicts 2014 consumption at 72.3bcf/d (up 1.3pc year-on-year), with 2015's about unchanged at 72.2bcf/d. See the EIA's Monthly Energy Review and the 5/6/14 Short-Term Energy Outlook ("STEO", Table 5a; next release 6/10/14). Higher demand (as well as increasing production) argues that the natural gas industry probably prefers to maintain larger arithmetic (bcf) inventories relative to prior history. In recent years, Growing working gas storage capacity in recent years reflects this.

Therefore observers should raise their estimate as to what is an average starting and ending inventory total in arithmetic terms for “nowadays”. The 471bcf long run average level for the start of build season and the 968bcf total for its end are too low for the current era.

For the eight year 2006-13 period, the stockpile at the beginning of build season averages about 656bcf. Thus the 3/28/14 inventory depth of 352bcf is extremely low for the start of build season, only 53.7pc of the 2006-13 average. The 2014 total is the lowest since 2003’s abyss.

Average PR inventory at build season completion for the 2006-13 span stands at about 1173bcf, a 517bcf and 78.8 percent boost versus the 656bcf commencement point. The average percentage increase for the eight years is about 83.1pc (90.2pc if one excludes 2012’s very low 33.4pc).

PRODUCING REGION 2014 STOCK BUILDING SCENARIOS

Max Bialystock states: “he who hesitates is poor.” (“The Producers”)

Assume normal US weather and modest American economic growth over 2014 build season. What will be Producing Region natural gas inventory when 2014 build season ceases?

The EIA’s May STEO forecasts end October 2014 PR inventories of 1020bcf, with end November’s 1023bcf. Since PR stocks attain their peak in mid-November, the implicit high probably is a few bcf over end November’s 1023bcf.

Viewers can construct potential end build season 2014 gas inventories via historical review. A key consideration in the current context is the extent of natural gas production increases.

Start with 3/28/14’s 352bcf. Suppose PR inventories grow by 100 percent; that leaves them well below average, at only 704bcf; applying the average long run percentage of 105.5pc leaves them at 723bcf. Alternatively, adding the average build over 1994-2013, 497bcf (a 141.2pc increase relative to 352pc), gives merely 849bcf. Expanding the late March 2014 stockpile by 2006-13’s 517bcf average gives only 860bcf. These tumble well below the EIA’s end October and end November 2014 forecasts. However, this script probably will not occur. Why not?

Close study of the preceding 1994-2013 table reveals a picture. Over the 1994-2013 era, there has been a tendency for end winter seasons with “high” Producing Region inventory levels to be followed by relatively modest percentage increases in inventory by the time of that calendar year build summit. Although 2012 is a banner case, note also 2006, 2009, and 2011. In addition, 1999 and 2002 also fit this pattern. In 1999 and 2002, end winter inventory was fairly lofty relative to preceding years (it took until end winter 2006’s 615bcf to exceed them).

The reverse also is true; large percentage leaps in build season inventory frequently follow situations starting with “low” PR supply. See 1994, 1996, 1997, 2001, and 2003. Arguably also 2004 and 2010 reflect this to some extent (2010’s 548bcf starting total stands about 16.5pc beneath the 2006-13 average).

Therefore, all else equal, and assuming normal weather and GDP growth (and with the inevitable warning that much can and does happen in the natural gas and related arenas), what conclusion follows? The well below average PR inventory level at the start of 2014’s build season probably

will inspire a significantly above average inventory expansion over the course of that build season.

But how high may PR inventories travel? Suppose the PR stock peak reached around mid-November 2014 is about 1030bcf (a slight upward adjustment based on EIA end October and November totals). This 678bcf boost represents a 192.6 percent rise relative to 3/28/14's 352bcf. The EIA's numbers thus involve a substantially greater than average stock build for the current build season. A 200 percent PR stock gain relative to the end of draw season low will leave PR stocks at the close of build season at 1056bcf ($704\text{bcf increase}/352\text{bcf}=2.0$; 704 plus 352 is 1056bcf). The 1030-1056bcf range nevertheless lurks a moderate amount beneath the 1173bcf end build season average for 2006-13. Thus PR inventories will be relatively tight, a bullish factor. A five percent dip beneath the midpoint of the 1030/1056bcf range gives about 996bcf.

Might the PR's stock increase for this year's build season be even greater? Much depends on whether natural gas production blossoms a fair amount more than the EIA estimates. Some prophets believe the EIA's views are conservative. The EIA outlook displays a notable but not a huge US production increase during calendar 2014 (STEO, Table 5a). Calendar 2014 total marketed natural gas production around 72.3bcf/day rises about 2.1bcf relative to calendar 2013 (calendar 2014 consumption rises about 1.0bcf year-on-year, allowing for some American inventory replenishment). Fourth quarter 2014 US production surpasses 4Q13's by 1.4bcf/d.

All else equal, for build season 2014, a one bcf/d increase relative to the current EIA forecast for the US over the national seven month natural gas build season of April through October (as noted above, the PR season is a bit longer) would push US stocks about 210bcf higher. However, not all of that hypothetical incremental build would occur in the PR. Suppose two-thirds of the additional 210bcf total ended up in the PR. Relative to the EIA's forecast, that would make PR stocks around 1170bcf (1030 plus 140bcf) and almost exactly 2006-13's 1173bcf average.

History need not repeat itself. In any event, a 250pc increase in PR stocks (see calendar 1996), though greater than benchmark forecasts such as the EIA's, are not inconsistent with greater than predicted production increases. This rise would leave them at about 1232bcf ($880/352$ is 2.5; $880+352$ is 1232bcf), moderately above 2006-13's 1173bcf average.

What about a 300pc jump? Even though this scenario is unlikely, recall 2001. Suppose this summer is significantly cooler than normal. Adding 1056 to 352 generates PR inventories of 1408bcf. Suppose PR supplies soar by a massive 350pc, challenging 2003's build percentage record. They will reach 1584bcf ($1232/352$ equals 3.5; 1232 plus 352 is 1584bcf).

Big US gas production increases of course would influence PR inventory totals and natural gas price trends. Drilling technology indeed has advanced significantly. Yet probably some anticipated output boosts are price sensitive. A NYMEX (nearest futures continuation) move to around four dollars may stop or delay their emergence (and pricing along the forward curve is relevant).

What does the relatively late start of 2013 build season relative to the 1994-2012 long run average (March 28 versus March 19) suggest about total PR stocks at the grand finale of build season? Some may conjecture that this implies a smaller overall build since there supposedly will be less time for building. However, about 10 days is not a large difference. Besides, the table above suggests that even if the build season is modestly briefer than average, that consideration is not as

important as the starting inventory size. Low inventory at the commencement of build season tends to generate above average stock increases; high supplies often inspire below average inventory growth.

THE CONTAINMENT VISTA

Now visit the EIA's "Peak Underground Working Natural Gas Storage Capacity" (2/28/14; next release anticipated February 2015). This study provides national and regional "Demonstrated Peak Working Gas Capacity" as of November 2013. For the United States as a whole, storage capacity rose 1.6 percent from November 2012's 4264bcf to 4332bcf in November 2013.

The November 2013 PR working gas storage capacity was 1487bcf, up 2.8 percent from November 2012's 1447bcf.

Suppose that at the end of build season 2014 Producing Region inventories sit at the high end of the estimates derived above (say around 1232bcf via a 250 percent ascent over build season). Or, recall 2014's lofty 1297bcf pinnacle. Or, suppose they balloon by the rather unlikely 300pc to reach around 1408bcf. Therefore, unless inventories grow by significantly over 300pc this build season, an unlikely event, the PR probably will not have containment problem at the end of build season 2014.

Also, natural gas storage capacity probably has continued to grow since November 2013. Although US Producing Region data is only available since 2007, it depicts continual year-on-year storage rises since then. For the Producing Region since November 2013, assume a two percent boost over the following year. That leaves storage in autumn 2014 around 1517bcf.

All else equal, substantial containment worries (as in 2012) probably tend to minimize inventory builds. Since the PR should not face containment concerns for autumn 2014, and as PR inventories at the dawn of build season were very low, inventory increases during build season 2014 probably will decisively exceed average levels.

PRICE AND INVENTORY THEATRICALS

"Money is better than poverty, if only for financial reasons." Woody Allen, "Without Feathers"

NYMEX's benchmark natural gas contract delivery location resides within the PR at Henry Hub, Louisiana. Overall flat price natural gas marketplace levels and trends intertwine with NYMEX intramarket spread relationship ones. US natural gas players should monitor inventories within the PR in the context of NYMEX's outright prices and intramarket spreads.

NYMEX intramarket spreads such as October 2014/January 2015 and March 2015/April 2015 reflect or confirm outright natural gas price travels and the gas supply/demand situation, particularly within the contract delivery region. All else equal, weaker outright NYMEX natural gas prices (especially in the nearer months) and declines in certain benchmark NYMEX intramarket gas spreads (increased contango or reduced backwardation) often suggest (especially within the Producing Region delivery region) actual (or anticipated) noteworthy increased production, falling demand, or both. Significant (or anticipated substantial) US inventory

increases, often in the Producing Region, in turn often reflect and confirm these bearish price and related supply/demand patterns. A similar relationship tends to hold between bull moves in the overall NYMEX natural gas complex, its intramarket spreads, and the supply/demand/inventory picture. For example, a bull trend in outright NYMEX prices frequently is mirrored by increasing backwardation (or shrinking contango) in the NYMEX March/April spread. Less than sufficient (or desired) production, consumption gains, or both probably would punctuate this bullish supply/demand scene. This supply/demand universe often would tend to involve low (or anticipated small) American inventory levels or relatively low increases in them (particularly in the PR.

NYMEX natural gas achieved a major low on April 2012 at 1.902 (nearest futures continuation), accelerating upward from 8/8/13's trough at 3.129 and 11/5/13's 3.379. This bull trend peaked at 2/24/14's 6.493; 4/30/14's 4.852 may turn out to be an important interim top. The NYMEX winter 2014-15 calendar strip established a key bottom at 3.797 on 11/5/13, right at the time as the one in NYMEX nearest futures. Compare the timing of the highs in the NYMEX winter 2014-15 calendar strip in February 2014 at 4.988 and late April 2014 at 4.963 with those in NYMEX nearest futures. The NYMEX March 2015 less April 2015 natural gas spread made an important low at on 11/19/13 at .138 backwardation, close in time to bottoms in the nearest futures and winter 2014-15 strip. This intramarket spread peaked at 2/21/14 at .775 backwardation, with a following interim top on 4/30/14 at .617.

Looking forward, how should one characterize the trend for the natural gas marketplace? What do US inventories in general and those in the PR in particular signal for prices? Assume normal weather and modest US economic growth. For the balance of build season, the trend looks sideways, with the probable price range around 3.80/4.00 to 5.00/5.20. However, significant shifts in inventory outlook relative to those given in the May STEO could result in price moves beneath or above those ranges. As noted above, production probably will be a crucial variable. So will issues such as coal switching and the behavior of noncommercial marketplace participants (investors/speculators).

Since the NYMEX nearest futures natural gas marketplace declined over 33pc since its February 2014 pinnacle, many would label the long run pattern as bearish. Note the similar moves in the key winter 201-15 strip and the March/April 2015 spread.

However, the nearest futures continuation marketplace remains far above the 4/19/12 major bottom, as well as the August and November 2013 troughs. Also, major support exists around 1/2/13's 3.05 low. In addition, overall US natural gas inventories, including those in the Producing Region, remain quite low and thus probably remain a bullish variable over at least the course of the 2014 build season.

Much can and probably happen in the inventory picture in 2014 and thereafter. Forecasters may have to tear up their current inventory blueprints. Yet PR inventories in the benchmark scenario range of 1030/1056bcf will sit moderately below the 1173bcf average for 2006-13. This inventory outlook is bullish. This (assuming a low total US stockpile) probably will tend to support prices around NYMEX 4.00/4.40 (nearest futures continuation). The more likely this inventory level appears to marketplace players, the more likely a move to and perhaps above 5.00/5.20 becomes.

Suppose production boosts generate PR stocks of about 1170bcf, around the 2006-13 average. These would tend to support prices at around 3.80. Even if prices slumped beneath this, average PR inventories would make it very difficult to break 11/5/13's trough near 3.38. If increases of 250pc or more in PR inventories look likely to develop during build season (which arguably they do not at this time), obviously they will tend to place even more significant pressure on prices.

The price decline to date from February 2014 heights (whether in NYMEX nearest futures, the winter 2014-15 strip, or the March/April 2015 spread) are not inconsistent with PR inventory around 1030/1056bcf at the close of build season. However, a sustained break under 4.00 probably would suggest (all else equal) that end build season PR inventory will move a fair amount higher (toward 1170bcf or so).

On a nationwide basis, inventory analysis on a days coverage basis (not just an arithmetic one) offers insight into natural gas price trends. End October inventories from 1990-2013 averaged 53.8 days coverage. Over the arguably more relevant 2006-13 period, they averaged about 56.7 days coverage. Based on the May 2014 STEO's estimate of 3405bcf inventory at end October 2014, days coverage will be about 47.1 days, well beneath the 1990-2013 average and far below (9.6 days) that of 2006-13. This is a very bullish situation.

Admittedly, EIA statistics suggest a less bullish picture by the close of winter 2014-15 draw season. The average end March coverage from 1990-2013 is around 21.8 days, with that from 2006-13 24.5 days. Assuming the May STEO forecast of March 2015 stocks at 1481bcf holds true, then days coverage will be about 20.5 days. However, less than average inventory at the end of that winter nevertheless is somewhat supportive of prices. The EIA asserts end February 2015 PR stocks will be 571bcf, with end March 2015's 599bcf.

The EIA foresees America's calendar 2015 gas production of 73.6bcf/day. This represents a 1.3bcf/d gain relative to 2014 (up around 3.4bcf versus calendar 2013's 70.2bcf). The 2015 production climb relative to 2014, when interpreted alongside 2015's demand edging down about .1bcf/d to 72.2bcf/d relative to calendar 2014, is bearish.

Suppose the retreat for NYMEX natural gas (nearest futures continuation) continued relative to the 2/24/14's 6.493 high. One time to look for an important bottom is in late August/calendar September 2014.

Historical review of Producing Region inventory levels and trends alongside NYMEX natural gas price trends and levels reveals a rough pattern. Although the history is relatively brief, there is a seasonal tendency for natural gas prices (NYMEX nearest futures continuation) to establish important bottoms sometime around late calendar August through calendar September and thus in the later stage of Producing Region (and US) build season. See the table above. Several of these lows were major trend change points. This is a guideline, not a destiny. Moreover, not every year has a notable bottom in late summer through fall.

A key issue for national and Producing Region natural gas inventories, and thus for gas prices, is the extent of switching in the electric power sector between coal and natural gas. In the electric power domain, calendar 2012 and its relatively low prices saw natural gas consumption leap to nearly 24.9bcf/day from 2011's roughly 20.7bcf/day. In contrast, calendar 2013 power sector demand, with gas prices higher in relation to 2012's, saw demand slump to 22.3bcf/d. The EIA

predicts 2014 consumption in the power sector of about 22.3bcf/day, about flat with 2013 levels (2015 edges up to 23.1bcf/d).

Appalachian coal (NYMEX nearest futures continuation; settlement basis) rose about 26.8pc from its 50.84 bottom (9/4/13) to its recent high at 64.48 (5/8/14).

What does the CFTC's Commitments of Traders for natural gas display regarding the positions of noncommercial players? Although not all noncommercial participants are "investors", alternative "investment" and other net long noncommercial positions reduce "free supply" in natural gas and other commodities marketplaces. For the benchmark NYMEX and ICE contracts (futures and options combined) plus the NYMEX European look-alike options contract, the total net noncommercial long (NCL) position as of 3/25/14 stood at about 265,000 contracts. This substantial net NCL position represents about 7.4 percent of total open interest.

In the natural gas complex, crucial highs and lows in price sometimes occur alongside notable levels in the net noncommercial position. This occurred in late February 2014. Remember 2/24/13's 6.493 top in NYMEX nearest futures continuation. The net noncommercial long high around 328,000 contracts occurred 2/18/14. The peak net NCL percentage relative to total open interest was 2/25/14's 8.4 percent.

Though the current (5/13/14) net NCL level of 208m contracts slumped a lot from 2/18/14's 328m, it still represents a sizeable increase from the net noncommercial short position (NCS) of about 5,000 contracts on 11/5/13 (and about 27m NCS on 11/19/13). Keep in mind the important nearest futures interim low at 3.379 on 11/5/13.

Recent net NCL levels reside beneath the 367m net NCL ceiling established 4/30/13 (7.6pc of total open interest; plateau percentage 5/28's 7.8pc). This net NCL top occurred alongside the key interim top in NYMEX natural gas (nearest futures continuation) at 4.444 on 5/1/13.

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