

## US NATURAL GAS INVENTORY: THE PRODUCING REGION SCENERY

© Leo Haviland, 646-295-8385

May 6, 2013

In Alfred Hitchcock's movie, "Lifeboat", Connie Porter asks the skipper: "All right, Commissar, what's the course?"

\*\*\*\*

### CONCLUSION

When United States natural gas 2013 build season ends this autumn, inventories in the key Producing Region probably will be around 1200bcf, plus or minus five percent (1140bcf to 1260bcf range). Based upon historic inventory patterns, especially those of 2006 to the present, most marketplace participants probably would view around 1200bcf as average. Unlike build season 2012, the Producing Region will not confront notable containment issues this year.

### US NATURAL GAS PRODUCING REGION INVENTORY (1994-2012)

The following table displays US Producing Region seasonal builds for the past 19 years from 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 1994-2012. The table lists many noteworthy price bottoms and peaks for NYMEX natural gas (nearest futures continuation), particularly ones around the later part of build season to "shortly after".

| <u>Year</u><br><u>(start date)</u> | <u>Inventory</u><br><u>Low</u><br><u>(bcf)</u> | <u>Inventory</u><br><u>Peak</u><br><u>(bcf; date)</u> | <u>Inventory</u><br><u>Change</u><br><u>(arithmetic)</u> | <u>Inventory</u><br><u>Change</u><br><u>(percent)</u> | <u>Natural Gas:</u><br><u>Key Price</u><br><u>Low/High</u><br><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)                        | <b>186</b>                                     | <b>642</b> (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)  |
| 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)   | <b>305</b>   | 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)  | <b>706</b>   | <b>356.6</b>  | 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)  | <b>706</b>   | 128.8   | 321 (10/27/10)  |
| 2011 (2/18)                        | 687  | 1261 (11/25)  | 574  | 83.6  | 498 (6/9/11)  |
| 2012 (3/9)                         | <b>965</b>                                     | <b>1287</b> (11/9)                                    | <b>322</b>   | <b>33.4</b>   | 190 (4/19/12)   |
| <b>AVERAGE</b><br><b>1994-2012</b> | <b>459bcf</b>                                  | <b>951bcf</b>   | <b>492bcf</b>  | <b>107.2pc</b>  |   |

\*\*\*\*

**The average date for the PR inventory abyss at end winter is approximately March 18. Build season plateau arrives around November 13.** Over the nearly 240 days from 3/18 to 11/13, the average weekly build is 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 107.2 percent inventory change in the column is derived from 492bcf/459bcf. The average percent calculated for the 19 individual periods added together and divided by 19 is 136.1pc.

**At its low point on 4/5/13, Producing Region working gas inventory was 690bcf.** This was a relatively late date for the inventory trough. The 4/26/13 PR inventory is 734bcf.

The NYMEX nearest futures contract highs of 443 (4/18/13)/444 (5/1/13; June 2013 actual contract top 446 on 4/18/13) probably are significant as well.

\*\*\*\*

Overall US natural gas demand (and increasing supply) shifted 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 66.8bcf/d and 2012 at 69.6bcf/d. The EIA predicts calendar 2013 demand at 70.3bcf/d; however, 2014 slips slightly to about 70.0bcf/d. Higher demand and supply argue that the natural gas industry probably would prefer to maintain larger arithmetic (bcf) inventories relative to prior history. In recent years, growing working gas storage capacity reflects this.

**So probably observers should raise their estimate as to what is an average starting and ending inventory total in arithmetic terms for "nowadays".** Thus the 459bcf long run average level for the start of build season and the 951bcf total for the end of the build are too low. Yet it nevertheless remains a challenge to define what currently is (and was previously) an "average" ("normal", "typical", "desirable") inventory level or range for any given time of year, whether in arithmetic or days coverage terms.

**In any event, for the seven year 2006-12 period, the average stockpile at the beginning of build season averages about 651bcf. Thus the 4/5/13 inventory depth of 690bcf is around normal for the start of build season.**

**The average at end of build season for the 2006-12 span is about 1155bcf, a 77.4 percent boost versus the 651bcf commencement point. The average percentage increase for the seven years is about 82.4pc (90.6pc if one excludes 2012's very low 33.4pc).**

### **PRODUCING REGION 2013 STOCK BUILDING SCENARIOS**

Assume normal US weather and modest American economic growth over the 2013 build season.  
**What will be Producing Region natural gas inventory when 2013 build season ceases?**

The EIA's 4/9/13 Short-Term Energy Outlook ("STEO"; next release 5/7/13) forecasts end 3Q13 PR gas stocks of 1046bcf, with end 4Q13 stocks at 1062bcf. Given that PR stock attain their peak before end December, the actual 2013 high will exceed the EIA's estimates for end 4Q13.

Over the past seven years, the average PR inventory climb from late September/early October to the build season pinnacle has been almost 120bcf, with the range roughly 50 to 200bcf. Adding 120bcf to the EIA's 3Q13 estimate gives **1166bcf** for the 2013 build summit. This is down about 9.4 percent year-on-year and beneath the 2009-2011 years as well.

\*\*\*\*

Viewers can calculate end build season 2013 gas inventories via a couple of other approaches.

In natural gas as in other marketplaces, what is a "high", "low", "average", or "significant" price or inventory level (or change in them) is a matter of opinion. These viewpoints on "high" and so forth (and on other supply/demand variables) can vary over time. On a nationwide basis, inventory analysis on a days coverage basis (not just an arithmetic one) offers insight. In any event, the preceding table unveils something more. Over the 1994-2012 era, for a given build season, there has been some 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 peak. 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 relatively high 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 15.8pc beneath the 2006-12 average).

All else equal, with the warning that much can (and does) happen in the natural gas and related theaters, **an average PR inventory level at the start of build season probably will inspire an average build over the course of that build season. Since relative to the 2006-12 horizon April 2013's start of build season inventory level appears close to average, therefore 2013 probably will see average stock builds.**

So start with 4/5/13's actual 690bcf. Add the average build over the 1994-2012, 492bcf, to this. That gives **1182bcf**. The average build of 2006-12 was 504bcf, rather close to the long run average; 690 plus 504 gives **1194bcf**. For build time 2013, assuming normal weather and natural gas prices well over the very low levels for much of build season 2012, calendar 2012's meager build probably will not be repeated.

\*\*\*\*

What about from the percentage perspective? Relative to past percentage builds relative to the start of build season, the 1166bcf and 1182bcf (and 1194bcf) totals appear somewhat conservative. The average build from 1994-2012 is 107.2pc. The 2006-12 seven year average is about 82.4pc (90.6pc excluding 2012). The 1166bcf stockpile climbs 69.0pc over 4/5/13's 690bcf level; 1182bcf rises 71.3bcf over it.

Suppose PR inventory rises 80 percent- a fairly conservative estimate relative to average- from the April 2013 low. Then end season inventories will be about **1242bcf**. Though modestly below 2012's apex, they are around those of 2009, 2010, and 2011. And underscore that end build season 2010 and 2011 (and even 2009) in turn were not far below 2012's 1287bcf. Remark also that the PR's 4/5/13 690bcf inventory matches that of 2009 and 2011 (3/6/09 was 690bcf, 2/18/11's 687bcf).

Thus assuming normal weather, modest US economic growth, and no substantial price collapse relative to the spring 2013 highs in the 440s, there is a reasonable chance that Producing Region inventory at end build season will come much closer to the 2009-2012 inventory range than many believe.

\*\*\*\*

Recall that NYMEX natural gas, after its powerful rally from its 190 major low on 4/19/12 at 190 (nearest futures), slumped from its 11/23/12 top around 393.

\*\*\*\*

**What is an overall inventory PR estimate at the end of build season 2013 derived via these three approaches? Dividing 1166bcf, 1188bcf-(the midpoint of 1182 and 1194), and 1242bcf by three is almost 1200bcf. That average plus five percent is 1260bcf, less five pc 1140bcf.** Recall also that the average at the end of build season 2006-12 is almost 1155bcf.

\*\*\*\*

What does the relatively late start of 2013 build season relative to the 1994-2012 long run average (April 5 versus March 18) 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. The table above nevertheless suggests that even if the build season is somewhat briefer than average, that consideration is not as important as the relative starting inventory level. Low inventory at the opening of build season tends to generate above average stock increases; high supplies often inspire below average inventory growth.

\*\*\*\*

A key issue for national and Producing Region natural gas inventories of course 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 25.0bcf/day from 2011's roughly 20.8bcf/day. In contrast, calendar 2013 with its higher prices to date relative to calendar 2012 displays declining natural gas demand in that realm. The EIA predicts 2013 consumption in the power sector of just under 23.0bcf/d.

### **THE CONTAINMENT SCENE**

Now visit the EIA's "Peak Underground Working Natural Gas Storage Capacity" (9/12/12; next release anticipated August 2013). This study provides national and regional "Demonstrated Peak Working Gas Capacity" as of April 2012.

Suppose that at the end of build season 2013 Producing Region inventories sit at the high end of the estimates derived above (say around 1240bcf). Or, suppose they reach 2012's lofty 1287bcf pinnacle. Or, picture that PR stocks exceed the 2012 peak by five percent to reach around 1350bcf. Relative to the April 2012 PR gas inventory level of about 1417bcf, and **even assuming no storage additions to that region for the post April 2012 period, the PR probably will not have containment problem at the end of build season 2013.**

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 2013, inventory increases during build season 2013 probably will decisively exceed the small arithmetic totals and percentages for the 2012 season. Arithmetic and percentage increases probably will approach average levels.** Again, an 80 percent increase in PR stocks from the April 2013

trough represents a fairly cautious prediction. Of course the natural gas price level and its relationship to coal (as in 2012) will influence PR (and other regional) stock builds.

\*\*\*\*

For the United States as a whole, storage capacity rose 3.3 percent from April 2011's 4103bcf to 4239bcf in April 2012. Since the EIA storage survey first appeared in 2006, total US demonstrated peak working gas storage capacity has grown every year. April 2011's 4103bcf rose 54bcf (1.3pc) versus April 2010's 4049bcf. The national estimate for April 2010 was 160bcf (up 4.1pc) over April 2009's 3889bcf. That marched up 86bcf (2.3pc) from the 2007 estimate (which apparently was for August 2007); 2007 rose 110bcf (3.1pc) versus 2006 (apparently June 2006).

\*\*\*\*

Although US Producing Region data is only available since 2007, it depicts continual year-on-year storage rises since then. Each year, the PR evidenced the majority of the national capacity build. The average yearly PR capacity build has been about 64bcf (5.3pc).

The April 2012 PR working gas storage capacity was 1417bcf in the Producing Region, up 5.7 percent from April 2011's 1340bcf. The April 2011 PR storage capacity of 1340bcf grew a modest 43bcf (3.3pc) relative to April 2010's 1297bcf. Prior years show significant capacity growth. April 2010 rose sharply versus April 2009's 1202bcf- 95bcf and 7.9pc. The April 2009 was up 56bcf (4.9pc) against April 2008's 1146bcf. The 2008 total climbed 50bcf (4.6pc) relative to the 2007 survey's 1096bcf.

Not only the recent yearly boosts in storage capacity in recent years, but also widespread marketplace faith in the trend of higher (over the misty long run) US natural gas production alongside rising demand (including rising exports, eventually) probably encourages natural gas storage creation. The total amount of incremental (new) storage added in the PR since April 2012 to the present, as well as what further space will be supplied by late autumn 2012, obviously are questions of fact.

For the Producing Region since April 2012, one can assume various percentage changes over the 18 months to generate estimates for end build season 2013 storage capacity. Suppose it is a very modest two percent. That leaves storage in autumn 2013 at about 1445bcf.

### **STAGECRAFT and TIMING**

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. Intramarket spreads such as March 2014/April 2014 reflect or confirm outright price travels and the natural gas supply/demand situation, particularly within the contract delivery region. For example, increasing backwardation (or shrinking contango) in the NYMEX March/April spread generally tends to indicate (confirm) a bull trend in outright NYMEX prices, whereas falling backwardation (or growing contango) often confirms bearish flat price direction.

US natural gas players should monitor inventories within the PR in the context of NYMEX's outright price and intramarket spreads. The EIA predicts in its April STEO that 1Q14 Producing Region inventories will be 779bcf, whereas end 1Q13 saw 699bcf.

\*\*\*\*

Suppose a bear trend for NYMEX natural gas (nearest futures continuation) emerged from the recent highs over 440. One time to look for an important bottom is in late August/calendar September 2013.

Historical review of Producing Region inventory levels and trends alongside NYMEX natural gas price trends and levels reveals a rough pattern. Assume that gas prices establish an important peak. 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. Some natural gas price lows were outside this calendar range. The 8/7/02 low was an important take-off point, with 10/27/10 a noteworthy valley. Moreover, not every year has a notable bottom in late summer through fall. In addition, long run history reveals that several major lows have occurred in calendar January and February. Remember too the major bottom of April 2012.

\*\*\*\*

This essay is furnished on an "as is" basis. Leo Haviland does not warrant the accuracy or correctness of this essay or the information contained therein. Leo Haviland makes no warranty, express or implied, as to the use of any information contained in this essay in connection with the trading of equities, interest rates, currencies, or commodities, or for any other use. Leo Haviland makes no express or implied warranties and expressly disclaims all warranties of merchantability or fitness for a particular purpose. In no event shall Leo Haviland be liable for any direct, indirect, special, incidental, or consequential damages (including but not limited to trading losses or lost profits) arising out of or related to the accuracy or correctness of this essay or the information contained therein, whether based on contract, warranty, tort, or any other legal theory.

All content copyright © 2013 Leo Haviland. All Rights Reserved.