Shale Gas, LNG and Rising Demand – Driving Global Gas Prices

By Benjamin Schlesinger*

As if there wasn't already enough talk about natural gas produced from shale formations, the flapping has intensified in the past six months. Now, even some otherwise staid, sober dull agencies, academics and geologists have gotten starry-eyed about the prospects for shale gas.

The U.S. Potential Gas Committee, a volunteer group of oil and gas developers, geologists and petroleum economists, opened the flood gates. They've quietly reassessed the U.S.'s non-proved gas reserves biannually for generations, always with about the same – but not this time. In its 2008 report (issued September 2009), the Committee suddenly raised its estimate of unproved U.S. gas resources by an astonishing 45%, from 32.7 trillion cubic metres (TCM) up to 47.4 TCM. This, together with the most recent estimate of proved reserves from the U.S. Energy Information Administration (EIA), has brought the US total to 54.3 TCM of gas remaining to be produced. All that would enable about another 86 years of U.S. gas production at current levels, i.e., likely well into the 22nd century.

But others are not as shy. The 30-year-old Virginia firm of Advanced Resources International, which estimates shale and other gas supplies based on direct field work, announced in March that the combined "resource endowment" of seven basins in the U.S. and Canada amount to 136 TCM of shale gas. Further, shale has become the lowest-cost gas resource, cheaper to drill for and produce than conventional gas. ARI's "magnificent seven" include the Barnett, Fayetteville, Haynesville, Woodford and giant Marcellus Basins in the U.S., as well as the Horn River and Montney Basins in British Columbia, Canada. Before long, Europe, China and others will get into the game as well.

Finally, never one for understatement, independent U.S. oilman Fred Julander recently said, "Shale gas is the most important energy development since the discovery of oil."

LNG supplies are increasing as well, and are set to rise by 38 percent in the next three years with completion of liquefaction trains that have already begun construction. Projects that are in planning will add to this number, e.g., LNG from Australia.

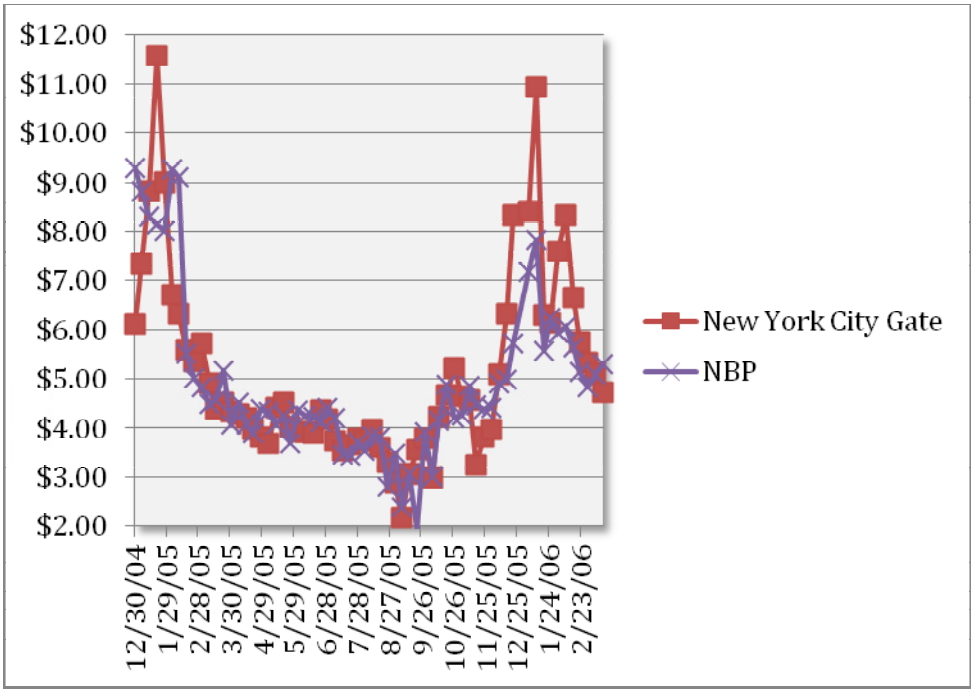

Figure 1
Spot Gas Prices Along the Atlantic, $/MMBtu
Source: BSA 2010, from World Gas Intelligence data.

Price Effects Already Emerging

What does all this mean, if it's even half true, for U.S. and global gas markets? The answer is: plenty. First, gas is gas, and supplies are, therefore, fungible as long as intercontinental transportation can be had – and transportation can be had, in fact, because rising LNG contract gas diversions and spot trading of LNG enable displacement of gas globally through exchanges and substitutions. In other words, extra supplies of gas produced in North America can, in effect, wind up in Europe, even if no ships actually export any LNG from here to there.

Spot prices bear this out. As shown in Figure 1, U.S. and NBP spot gas prices have borne a close relationship for the past year and a half (78.6% percent R-squared). With LNG diversions and substitutions, this is likely to continue, and even tighten, as U.S. overproduction of shale gas forces the price of gas down on both sides of the Atlantic.

Then what happens to gas prices in Europe? Low spot gas prices place significant commercial pressure on long-term contracts, since buyers are more inclined to use low-priced spot gas than excess gas under their base purchase agreements.

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For example, to the extent spot gas market prices undercut contract prices tied to petroleum price indices, buyers will prefer to ride along on their minimum take-or-pay volumes.

There are three major complications on the road to gas price recovery.

First, more and more LNG that would have otherwise have gone to the U.S., will attempt to go to Europe, thus raising available spot gas supply levels and putting downward pressure on prices. Some LNG that can't land in Europe will be unloaded and stored in the U.S., thus depressing Atlantic market prices anyway.

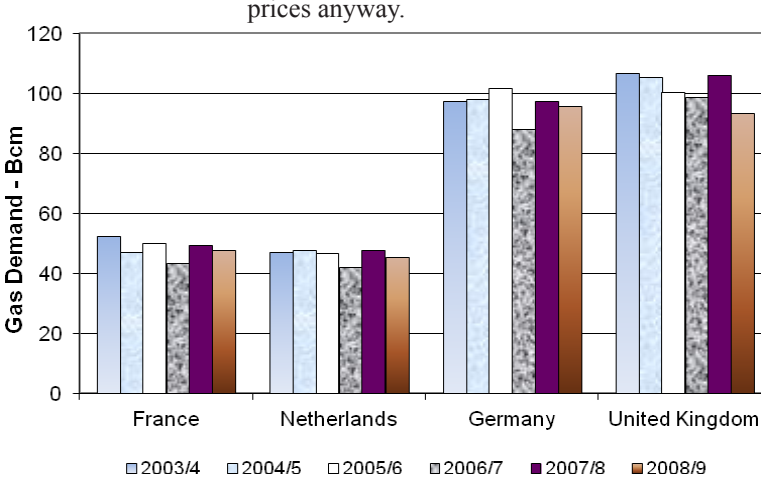

Figure 2
European Gas Demand Response to Recession

Source: Gas Strategies, 2010.

Second, Europe's economy is bound to recover from its present doldrums and return to normal growth levels. But until that happens – and it hasn't happened yet – industrial and power plant gas demand will be lower than usual. For example, Figure 2 shows how greatly and consistently Europe's industrial demand levels have sunk in response to the current recession. Lower demand amidst higher supplies means prices are pushed lower still.

Third, the drive toward slowing the pace of global warming may directly cause some reductions in gas demand. That's right…reductions. This is surprising because atmospheric carbon rules should favor natural gas, which emits less carbon dioxide than coal or oil when burned. But Europe's aggressive 20/20/20 program, which requires a 20 percent reduction in greenhouse gases in the next decade, could have a depressing effect on gas demand and prices. In addition to 20 percent less greenhouse gases, Europe's program would also require 20 percent increased use of renewable energy and a 20 percent reduction in energy demand – all three goals to be met by 2020. The latter two components of Europe's program would more than reverse gas demand growth that might have accompanied the required reduction in greenhouse gas emissions.

Key: The Pace of Economic Recovery

Collectively, these forces may spell trouble for global gas market prices in the next several years. As shown in Figure 3, the balance of forces affecting global gas prices is likely to remain negative for some years, and even intensify as new LNG supply projects come on line in Asia, West Africa and Australia. This situation may ease, and even reverse, however, when the world's economies improve and gas demand can increase, thus begin to soak up the LNG and shale gas surpluses.

Timing and geography will be critical to how quickly the gas supply imbalance reconciles and where gas prices might recover. Looking at Figure 3, it is clear that some influences may offset one another if they evolve at the same time. In particular, the rise of gas shale production ought to go hand in hand with the implementation of carbon emission rules. This could play out in several ways:

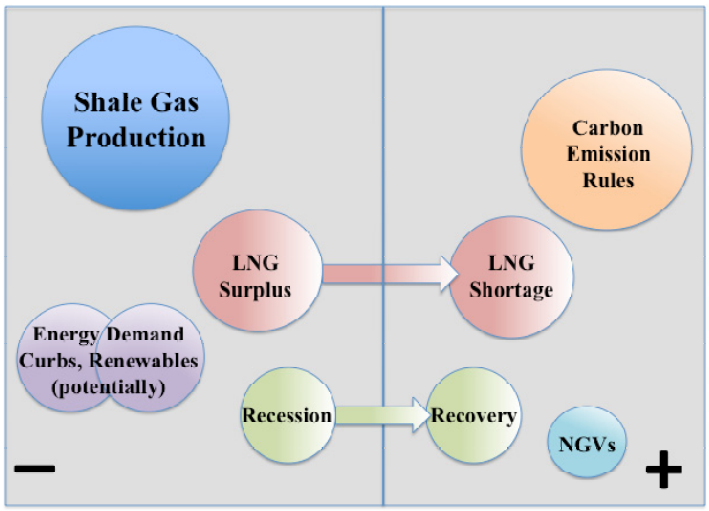

Figure 3
Likely Forces Affecting Global Gas Prices

Source: BSA 2010.

First, in the short run, the global oversupply of LNG won't last forever because pipeline gas supplies from older producing areas will continue their inevitable annual declines. In addition, as global economies improve, sagging gas demand will revive in industries, power plants, and commercial buildings. The pace of these two forces is in question, however – many observers simply assume rising demand will soak up surplus LNG, but the devil is in the details – and timing is everything. We've seen many times that pipeline supplies just refuse to dwindle in the time predicted, which has caused unforeseen price upsets.

The shape of the economic recovery remains very much in question, as illustrated in Figure 4. In 2009, most economists believed the world was in a V-shaped recovery, with quickly rebounding growth and energy

demand expected in 2010 and 2011. More recently, however, the prevailing view is that the industrialised world is facing rather a U-shaped recovery, with improvement more likely to take place in 2012-2014, thus delaying the resurgence of gas demand. Others argue that the recovery may follow a W-shaped path, i.e., that a second recession is bound to hit sometime in the next year. Luckily, few seem to believe that the world will have to suffer an L-shaped path, i.e., no recovery at all!

Each of these 'letters' matters a great deal. The path to recovery is clearly at the heart of the gas pricing issue in the short-term. Indeed, recovery paths may differ within the industrialized world, with recovery in China and South Korea outpacing Europe, Japan and North America. Hence the LNG supply surplus, intensified by rising shale gas production, may hang around longer than expected.

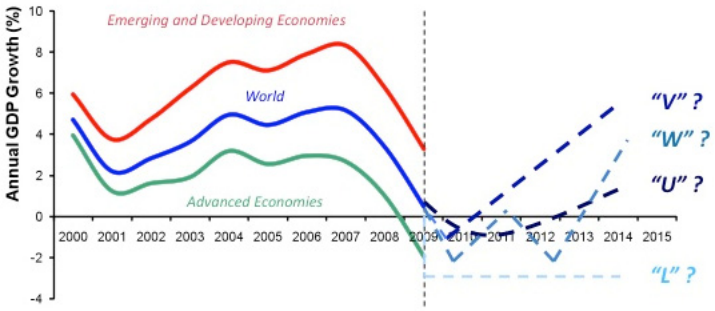

Figure 4
Possible Shapes of Economic Recovery
Source: Deutsche Bank, Adam Sieminski, 2009.

Ultimate Harmony: Shale Gas with Carbon Restrictions

In the longer run, carbon rules need to recognize and embrace the growing role that gas can play through rising production from low-cost shale gas resources. In the first half of the 2010s decade, growth in shale gas production will take place in North America and then, later, in Europe, China, and elsewhere. But gas demand will become the paramount 'supply' issue. This is so because, unlike LNG, shale gas development is flexible, comes in much small increments than LNG supply trains, and (in North America) takes place without long-term gas sales contracts. Thus, a strong base of incremental gas demand is necessary to enable shale gas production to rise; without that, shale gas supplies will fall off.

The most important source of incremental gas demand consists of direct restrictions on emissions of greenhouse gases. As suggested in Fig. 3, carbon emission rules could become as important a contributor to the gas market balance on the demand side as shale gas is on the supply side. Again, timing is everything. If carbon rules are introduced too slowly, then shale gas development will suffer. But if carbon rules are promulgated and enforced quickly and vigorously, then shale gas development will move quickly as well.

Amidst carbon and shale gas pushing and pulling on gas prices, lie two developments that threaten to upset growth in gas demand, namely, the other two parts of Europe's 20-20-20 programme – capital funding of renewables and forced reductions in gas and energy demand. While obviously laudable, these need to be introduced in an organized way that targets high-carbon fuels, rather than natural gas – if not, their laudable effects will backfire. Replacing low-carbon natural gas with renewable resources will reduce far fewer greenhouse gases than replacing high-carbon fuels. Likewise, conserving energy demand at the expense of gas supplies or even nuclear power would not seem to make sense as a greenhouse gas reduction strategy, as opposed to replacing coal demand.

Finally, natural gas vehicles (NGV) are another potential market of importance to maintaining a balance of gas supply and demand. NGV growth needs to be encouraged alongside electric vehicles (the latter from nuclear, renewables and high-efficiency gas-fired GCGTs) so that greenhouse gas reductions will be accelerated. New NGV technologies have been quietly developed to make this easier, e.g., Johns Hopkins Applied Lab's 'flat' tank that enables NGV passenger cars with both a large boot and long-range service between fills.

Conclusions

Shale gas development is proving to be the low-cost option, lower than gas from conventional resources. The downward price effects of increased North American shale gas production are already being felt in Western European spot gas markets via rising LNG trade in the Atlantic LNG. By mid-decade, shale gas development will proceed apace in Europe and China, and there will be more of it still in the U.S. and Canada – but shale gas growth will be stifled without gas demand recovery and policies that encourage incremental gas markets, particularly for electricity generation in a context of carbon emissions rules, and NGVs.