The Natural Gas Cliff

by

Dale Allen Pfeiffer

October 26th, 2005

The situation for natural gas differs from the situation for oil, but it is not any brighter. While pumping oil from the ground is somewhat like drawing syrup through a slushy, pumping natural gas is more like poking a hole in a car tire. This is due to the fact that oil is a liquid and natural gas is a gas. When you poke a hole in a car tire the air will escape for some time, flowing freely outward until pressure is equalized between the outside atmosphere and the interior of the tire. To extract the remaining air from the tire, you must attach it to a vacuum pump, or squeeze the inner tube.

Tapping into a body of natural gas is generally less costly than tapping into an oil field. Once the wells are drilled, you simply have to hook them to a pipeline. Natural gas production increases rapidly from the time a field is first put into production. Production will rise until the field is fully covered with producing wells. Then production will flatten out and continue for some length of time. Once the production of a field has flattened out, it is difficult to increase it further. If you wish to increase production, you must find another field. At some unknown point, production in the field will fall into a marked decline. The decline rate for natural gas fields is much higher than the decline rate for oil fields; somewhere in the neighborhood of 5 to 10%, compared to oil's 2 or 3%. Because the decline is so steep, it is known as the natural gas cliff. There is little warning of the cliff in the production of the field. The last square foot of gas to be extracted from a field before production falls off of the cliff will require no more effort than the first square foot extracted from the field.

Because we are dealing with a gas here, measurements are different than those we use for oil. Oil is measured in barrels or metric tones. Natural gas is measured in cubic feet, most commonly in billions of cubic feet (Bcf), or trillions of cubic feet (Tcf). A trillion cubic feet may sound like a lot, but we must remember that gas is less dense than oil so it holds less energy. U.S. demand for natural gas is expected to rise to 30 Tcf per year by 2010. At one time, it was believed that most of this would come from the Gulf of Mexico, but the US Minerals Management Service expected gulf production to begin declining this year, from a peak of 6.1 Tcf per year.

The North American outlook for natural gas production is not good. Mexican production has been in decline since 1999. U.S. production has been in a plateau for some time. All the big finds have been tapped and are in decline. Currently, we are bringing new wells online at a maddening pace just to keep our domestic production flat. And the new wells are declining at rates as high as 80% in the first year. The size of the new finds is also diminishing. Over the past decade, the amount of gas found per foot drilled has declined by 50%.

The United States turns to Canada to make up the difference between its own flattened production and rising demand. Canada currently supplies at least 13% of the U.S. gas demand. Yet Canada's large fields have flattened out in production, and it is likely that Canadian production will fall off the cliff within the next several years.

Worldwide, natural gas production will not begin to decline for at least another decade, and by some estimates not for twenty to thirty years. However, because we are talking about a gas, world production is not as important as regional production. We must look to North American natural gas production to meet the lion's share of our needs. Natural gas is most easily transported in pipelines; it is very difficult to transport overseas. The only effective way to ship it is to liquefy it, transport it in specially designed refrigerated tankers, and then unload it at specially designed facilities which will thaw it back to the gaseous state. All of this is done at an estimated 15 to 30% energy loss.

Currently, there are only four Liquid Natural Gas (LNG) offloading facilities in the country, located in Louisiana, Georgia, Maryland and Massachusetts. In 2003, we imported an average of 1.5 Bcf per day (Bcf/day). This amounted to 2% of our natural gas demand of 67 Bcf/day. By the end of 2006, we are hoping to add another 3 Bcf/day of LNG imports. But by the end of the decade, demand is expected to rise to 77 Bcf/day.

Today the global fleet of LNG tankers numbers 140, with a capacity of 14.5 Bcf/day. By the end of the

decade, the U.S. will require the equivalent of this entire fleet just to service our needs. LNG tankers cost an average $155 million per ship to build. So the tanker fleet alone will require an investment of $13 billion. Add to this the expense of building over 30 new LNG projects and the associated pipelines, and the necessary investment quickly climbs over $100 billion. Considering our current budget deficit and the precarious state of the U.S. economy, this sort of investment is unlikely.

This is why politicians and the corporations who pay them are clamoring to open currently restricted areas of Alaska, the Canadian Arctic, the U.S. Rocky Mountains, and the deep ocean to natural gas development. Yet, the eventual investment in pipelines and drilling rigs to tap these sources would be even higher than the cost of LNG development: an estimated $120 billion in infrastructure. And from the time construction begins on this infrastructure, it will take 5 to 7 years before any of this gas begins to flow. In total, we are talking about less than a decade worth of natural gas here, at our current rate of demand.

In the United States, 60% of all homes are heated with natural gas, and this percentage is increasing as over 70% of new homes utilize natural gas for heating. Because natural gas burns cleaner than coal or oil, electric generating plants are turning to natural gas to meet stricter environmental standards. By 2002, 90% of all new power plants were gas-fired. Natural gas also has many other important uses; most notably, it provides the feedstock for our fertilizer industry.

The North American natural gas cliff is the other side of the approaching energy crisis. Our economy, and our very lifestyle, is caught between the gas cliff and the oil peak. Between them, they are going to make life very difficult in the years to come.