Phoenix Project Foundation

Rising from the ashes of the fossil & nuclear fuels
to a Solar Hydrogen Economy by 2020

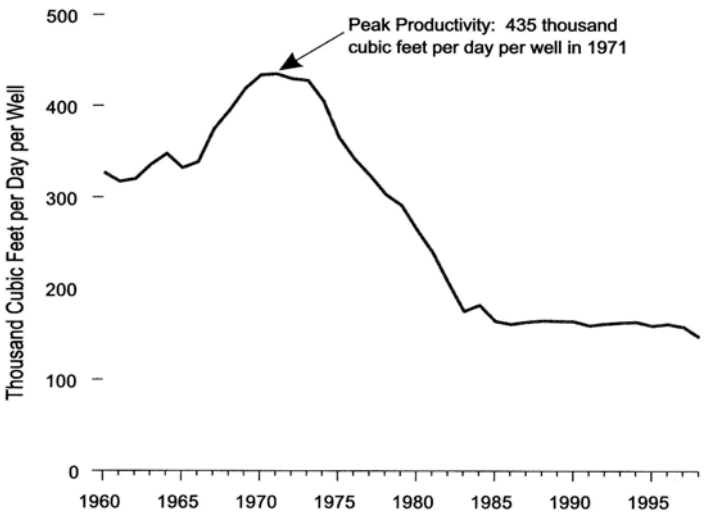
Natural Gas is Not the Solution

By Harry Braun

Natural gas is the cleanest burning fossil fuel, but it is a rapidly diminishing resource that causes significant long-term environmental and water contamination in its extraction process. According to the U.S. Energy Information Administration, natural gas production in the U.S. peaked in 1971 and has been declining ever since in spite of record numbers of gas wells being drilled. It is why most analysts assume importing natural gas is inevitable. It is why natural gas companies have invested billions of dollars in constructing liquefied natural gas (LNG) terminals in the U.S. However, according to an article in *The New York Times* (May 29, 2008), natural gas shipments to the U.S. have slowed to a trickle due to international demand, leaving a new $1.4 billion LNG terminal constructed in Louisiana by Cheniere Energy sitting idle. Thus huge new LNG terminals and tankers sit empty, awaiting natural gas imports that may not come.

U.S. Natural Gas Well Productivity

(Source: U.S. Energy Information Administration)



Two of the largest recoverable natural gas reserves in the U.S. are located in Alaska's North Slope, which is estimated to contain approximately 85 trillion cubic feet, and the Powder River Basin in Wyoming and Montana, where the Bush Administration sought to have natural gas producers drill over 75,000 coal bed methane wells over the next 10 years in order to recover an estimated 25 trillion cubic feed of natural gas. However, given the U.S. consumes about 25 trillion cubic feet of natural gas annually, such reserves could only sustain U.S. consumption for less than 5 years. While some analysts estimate that there are enough natural gas reserves to meet U.S. demands for over 60 years, the long term environmental damage from natural gas extraction is rarely mentioned.

The Temporary Production of Natural Gas Results in Long-Term Environmental Damage

The most formidable obstacles in the Powder River Basin are not environmental groups, but Republican ranchers who are already being devastated by the billions of gallons of what is referred to as "product water." According an article in *U.S. News & World Report* (March 12, 2001), each natural gas well will typically produce about 12,000 gallons of this byproduct water daily -- or roughly 4.4 million gallons per year. Normally, water is a good thing, but in this case, the product water has such a high salt content that kills the crops and native grasses in the area. As Dennis Hemmer of the Wyoming Department of Environmental Quality indicated, "the salty water seals the soil so crops are simply unable to grow." The 12,000 existing wells developed in the basin area have already left ugly scars on the landscape. An additional 77,000 wells would be potentially devastating. The pumping depletes the underground aquifers and threatens the long-term viability of agriculture in the region.

In addition to the problems of water contamination, ranchers in the area are forced to put up with the deafening noise coming from the natural gas compressor stations on the surface that roar like jet engines 24 hours a day, 7-days a week. In addition, the Bush Administration's natural gas plan in the basin will require building over 17,000 miles of new roads for the 18-wheeler trucks that will rumble through the area 24-hours a day; 20,000 miles of pipelines; 200 compressor stations and approximately 5,000 containment pits for the product water. The ranchers, who typically do not own the mineral rights under their property, now realize that they are helpless as they watch the daily destruction of their way of life.

Natural Gas from Shale

One of the newest methods of natural gas production involves extracting the gas from shale rock formations using hydraulic fracturing of the shale deposits, which involves fracturing rock by injecting a mixture of water, sand and chemicals at high pressure into deep wells. This requires the use of millions gallons of chemically treated water to break up subterranean shale in order to release the gas that is trapped inside, but the chemicals used are toxic and will eventually leach into groundwater supplies.

One of the largest shale formations is the Marcellus Shale region in the states of Pennsylvania and New York, which geologists have indicated could contain enough natural gas to meet U.S. demand for two years. But a report by Argonne National Laboratory documented that water discharged as a byproduct of gas drilling in shale formations is 10 times more toxic than water discharged from oil platforms.

A report by nonprofit news service *ProPublica* and public radio station WNYC cited instances of drinking-water contamination in states where hydraulic fracturing was conducted. According to Manuj Nikhanj, an analyst with Ross Smith Energy Group, a Calgary-based research firm, these environmental permitting issues are likely to slow the pace of Marcellus Shale development, making it more costly for the natural gas producers.

All of this unnecessary and long-term environmental damage is part of the "external costs" for only one year's supply of natural gas. If that were not bad enough, there are also serious environmental problems associated with the emissions that will come from operating the natural gas-fueled power plants. Each power plant will emit thousands of tons of nitrogen oxides, carbon monoxide, carbon dioxide, volatile organic compounds and particulates annually. In addition, these 30-year design life power plants will consume roughly 100,000 acre feet of water annually, and much of that water is intended to come from already seriously depleted groundwater supplies.

The Answer is Blowing in the Wind

Wind machines have been providing mechanical power for humans for over a thousand years, and they can now be mass-produced like automobiles to make the U.S. energy independent of not just imported oil and natural gas, but all fossil and nuclear fuels. Approximately 5 million two-megawatt wind-powered hydrogen production systems would be required make the U.S. permanently independent of its current dependence on all fossil and nuclear fuels. Moreover, given that over 5 million cars and trucks are manufactured in the U.S. each year, the 5 million wind systems could easily be built and installed within a five year period. An additional 15 million units would displace fossil and nuclear fuels worldwide, thereby providing sustainable prosperity without pollution from the wind and the water.

It is important to understand that the primary obstacles to large scale use of wind power is the fact that winds are unpredictable, and even at a good wind site, the wind typically only blows about one-third of the time. The other major limitation is that most of the existing high-voltage transmission lines needed to transport the wind-generated electricity are already full. However, both of these obstacles are eliminated if the wind machines produce hydrogen as their primary product, instead of just electricity.

Unlike electricity, hydrogen can be stored and transported to world markets just like oil or gasoline, and it can be used as a pollution-free "universal fuel" that can be used for the transportation sector as well as homes and power plants. As such, hydrogen is the critical element needed to make wind and other solar technologies practical, and if wind systems are mass-produced for large-scale hydrogen production, their contribution can be increased from less than 1% -- to over 100% of the U.S. energy requirements! Millions of jobs will be created as the U.S. is transformed from the world's largest energy importer, to a Saudi Arabia-class energy exporter, with a pollution-free fuel that is inexhaustible.

The necessary land exists in abundance in the U.S., where most ranchers and farmers will be able to earn more income from wind farming than they do with cattle or crops. However, the best areas to place most of the wind systems would be at sea where such "Windship" hydrogen production systems could not only make America energy independent of natural gas and other fossil and nuclear fuels, which ironically would simultaneously provide a critical sanctuary for the ocean ecosystems that are rapidly being exterminated by oil spills and unregulated "free market" destructive fishing practices. Thus in a very real sense, the answer to the most serious energy, economic and environmental problems is blowing in the wind.