FAQs

Thursday, 23 August 2007

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Q. If electricity is generated as part of the RET process for producing hydrogen, why not simply sell the electricity?

A. The process for producing electricity is inherently inefficient compared to a RET process for producing hydrogen. The reason for this is due to the way electricity is generated in conventional power plants. The generation of electricity relies on implementation of a thermodynamic cycle. High temperature steam is generated in a boiler or extracted from the ground as a geothermal resource, passes through a turbine whereby work is extracted in the form of electricity and the spent steam is exhausted from the turbine and condensed to water whereby the cycle is repeated. The energy in the waste steam (>50% of the original energy) is lost and removed via expensive condensers and cooling towers. On the other hand, the RET process uses both the electricity and the energy in the waste steam to produce hydrogen. RET is a more efficient way of utilizing the original energy in the steam. The theoretical thermal efficiency of a RET process is about 95% whereas a typical power plant thermal efficiency is about ~50%. Geothermal power plants are even less efficient (<20%) because of the lower temperature of the incoming steam. For a more in depth discussion of this, please go to the TECHNICAL DOCUMENTS section of our web site. The technical article, "An Analysis of the Thermal Efficiency of RET (radiant energy transfer) in the Production of Hydrogen Compared to the Generation of Electricity from Geothermal Resources, by Ronny Bar-Gadda" expands on the above description using the principles of thermodynamics and physics.

Q. How does RET stack up with other commercial hydrogen technologies?

A. Today, there are two commercial technologies for producing hydrogen; steam methane reforming and electrolysis. Steam methane reforming is a process that uses methane as a source of hydrogen. Methane is burnt to provide the heat and steam needed to pull off the hydrogen atoms from the methane molecule. As prices rise for methane (due to political and resource constraints) the price of hydrogen will also rise. Steam methane reforming is also an intense global warming technology where 14 kilograms of carbon dioxide are produced for every kilogram of hydrogen generated. Although electrolysis has a high efficiency, (~70%), it relies on external sources of electricity. Since the most common source of electricity is from fossil fueled power plants, the net efficiency may drop to levels close to ~25% due to the inefficient process of making electricity. Furthermore, electrolysis is a greater global warmer than steam methane reforming (because of the fossil fuel component) resulting in a generation of 22 kilograms of carbon dioxide for every kilogram of hydrogen produced. RET does not rely on a carbon source. In addition, the efficiency is very high compared to the above technologies. Further information is provided in the TECHNICAL DOCUMENTS section of our web site. The technical article, "Evaluation of Genesys Technology to Produce Hydrogen from Water Compared to Electrolysis and Steam Methane Reforming, by Ronny Bar-Gadda" is given there.

Q. Why can't we use natural gas as a substitute for oil?

A. Exxon says N. America gas production has peaked

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NEW YORK (Reuters) - After weak prices in the 1990s due to oversupply, natural gas production in North America will probably continue to decline unless there is another big discovery, Exxon Mobil Corp.'s (XOM.N: Quote, Profile, Research) chief executive said on Tuesday.

"Gas production has peaked in North America," Chief Executive Lee Raymond told reporters at the Reuters Energy Summit.

Asked whether production would continue to decline even if two huge arctic gas pipeline projects were built, Raymond said, "I think that's a fair statement, unless there's some huge find that nobody has any idea where it would be."

Exxon is a major player in the two multi-billion dollar pipeline projects that could bring stranded arctic gas to Canada and the lower 48 states.

"The facts are that gas production continues to decline, and will start to decline even more rapidly. By the time we get to that period (2010-2012), we'll need it badly."

Stranded natural gas reserves on the Alaskan North Slope and in the Canadian arctic could total more than 40 trillion cubic feet, according to analyst estimates.

While the number of U.S. rigs drilling for natural gas has climbed about 20 percent over the last year and prices are at record highs, producers have been struggling to raise output.

Experts said easy onshore and shallow water basins have been mostly tapped or are off limits for environmental reasons, and new technologies like horizontal drilling have been draining wells in two or three years, a much faster rate than the five years or more during the 1990s.

The U.S. Energy Information Administration estimates that natural gas production will be flat this year and increase only one-half percent next year.

At the same time, demand for the cleaner burning fossil fuel is expected to grow by two percent this year and almost 2.5 percent in 2006, according to EIA, the statistical arm of the Department of Energy.

We are heading toward a crisis. Natural gas is used to produce at least 17% of the US's electricity and to heat more than half of US homes, including some 70% of new homes.

The problem is that we are pretty much limited to the natural gas (methane) available within our own continent. Since methane is a gas at normal temperatures, the only way to ship it between continents is to cool it to very cold temperatures (about -260 degrees F), ship it in special tankers as LNG (liquefied natural gas), and offload it in specially-equipped ports. The tankers and ports do not exist to handle any significant fraction of US natural gas use. Currently, only about 1% of natural gas used in the US comes from LNG.

The other alarming aspect of a natural gas production peak is that gas production falls off much more sharply than oil production after it has peaked. Gas rises in a reservoir of its own accord, maintaining pressure and a high rate of production even in a depleted reservoir. By the time a reservoir's production peaks, it is much closer to being fully depleted than an oil reservoir is when it peaks. The attached graphs illustrate that natural gas reserves have been flat or declining for the last 20 years. Production of natural gas is also declining.

Conclusion: natural gas production is about to become a problem for the US, and the problem could worsen very, very rapidly.

Q. Can RET Technology be used in cars?

A. The hydrogen produced by the RET process can be used as a fuel for cars and trucks that are built or modified to run on this gas. Although we believe the ultimate source of hydrogen for the transportation sector will come from geothermal "hydrofineries", an intermediate solution will probably be based on stand-alone RET stations distributed strategically, in order to satisfy the needs of the driving public. These RET stations may be located at your neighborhood gas station, local grocery store, etc. This will depend on the various partnerships we develop as the hydrogen economy unfolds. The question is not if these things transpire, but when.