Sources and sinks

CO_2 SEQUESTRATION TECHNOLOGIES NEED TO BE LESS COSTLY AND MORE EFFICIENT

I won't pretend to be an expert on Green House Gases (GHG), but I am predisposed to believe in the scientific community on the global warming issue. I will also admit that part of my problem is relating to anything beyond 10^6, whether it's the distance to the moon or the federal budget.

I attended the Fourth Annual Conference on Carbon Capture & Sequestration, held last week in the Washington, DC area. There were approximately 450 registered participants, with an estimated 20% coming from outside the U.S. About 70% of the participants were from the academic and scientific communities. Industry participants included industrial gas producers and major oil companies, either directly or as part of an industry consortium, as well as a few of the major equipment suppliers and utilities.

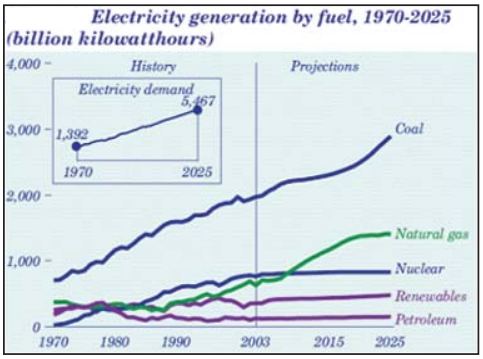

Figure: The U.S. Energy Information Agency predicts that coal use will continue to grow through 2025

The general consensus among participants is that technologies exist today to accomplish widespread carbon capture and sequestration, but that they cost too much and they need to be more efficient. Of course, all of this is driven by the need to use the coal resource, so abundant in the parts of the world that are expected to experience the largest growth. Coal is reliable and available as well as being the lowest cost fuel, and it holds great promise for the developing world.

Utilities in the U.S. have announced 118 new coal-fired power plants to be built by 2012 (Figure). China has plans to build 562. The good news on GHG is that these are highly concentrated, large point sources of CO_2.

The technologies to capture the carbon include both pre-combustion and post-combustion techniques, as well as the carbonless or "oxy-fuel" approach. In the oxy-fuel system, coal syngas is burned in a mixture of oxygen and re-circulated flue gas in order to reduce the net volume of flue gases from the process, and to substantially increase the concentration of CO_2 in the flue gases.

Once concentrated and captured, the intent is to use the CO_2 as a commodity that it is, or to sequester it in a variety of geological formations.

There are two large-scale productive uses for CO_2, one proven and one in development. The use of CO_2 for enhanced oil recovery is well-documented, proven and valuable, and there is a belief that a similar opportunity exists to recover and replace coal bed methane with CO_2.

The current thinking on CO_2 sequestering is that deep saline aquifers, salt caverns and fractured basalts offer excellent opportunities for long-term, safe and stable storage. These applications require high pressure CO_2 compressors to reach the 74 bar critical point of CO_2.

The planning process has and will continue to look for opportunities where CO_2 sources and sinks are economically compatible. For our community of turbomachinery enthusiasts, this will take the form of pipeline and CO_2 compressors in the near term and possibly CO_2 working-fluid gas turbines and combined cycle plants.

This does create an interesting regulatory dichotomy. Should CO_2 be classified as a commodity and subject to oil & gas law, or should it be classified as a pollutant and subject to environmental law. As was pointed out, the classification of CO_2 as a pollutant would mean that it is legal to emit it from a point source, but illegal to do anything about it.

As a friend commented, "It is like a plant. It is either a weed or a flower, depending on where you want it." TI

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