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Is Coal The Fuel Of The Future?

Law360, New York (February 12, 2009) -- Regardless of where you stand on the solution to climate change, eventually you must concede that “clean coal” is likely to be part of the solution, at least during our transition from fossil fuels to renewable fuels.

In a July 27, 2008, speech, former Vice President Al Gore challenged the country to “commit to producing 100 percent of our electricity from renewable energy and truly clean carbon-free sources within 10 years,” comparing the challenge to the 1960s race to the moon.

Most technologists, however, believe it would take at least 20 years (and probably longer). During the lengthy period required to build a renewable power infrastructure capable of supplying our energy needs, we will continue to generate a sizeable chunk of our electricity from coal.

Fifty Percent of Our Electricity Comes From Coal

According to the U.S. Energy Information Administration, one-half of the electricity consumed in the United States comes from coal.

No matter what form of climate change legislation Congress decides to adopt, no matter how restrictive the limits on carbon dioxide emissions or how short the horizons are set to achieve those limits, coal must remain a major source of electricity in the U.S. for quite a while longer.

You cannot simply replace 50 percent of our power source overnight. Think of the massive new investment in infrastructure needed to generate and transmit power from solar and wind farms to consumers.

Moreover, think of all those “stranded costs” associated with existing coal-burning power plants — investments that utilities are entitled to recoup from customers over time through highly regulated utility rates. All of those costs will be passed along to the consumers, and it is going to be expensive.

Converting to Renewable Fuels Will Require Sacrifice

Washington lawmakers contemplating climate change legislation are getting a first-hand glimpse of the practical effects of a carbon-constrained future. Those who think this is going to be easy recently got a jolt of reality in the mail.

Electricity bills in the Nation's Capitol soared in December 2008 and January 2009, and many customers have fallen behind on their bills (54,000 according to ABC News).[1] Here are a sample of recent blog entries[2] from irate Washingtonians:

- "Our PEPCO bill jumped from $334 to $803 from Dec-Jan."

- "I am in Gaithersburg, MD. My Pepco bill for the period Dec. 18-Jan. 17, 2009, was $1,057.99. My bill for the previous month was $183.05. When I called Pepco to report they basically told me that there was nothing wrong with the bill or meter. Because of the colder winter the power usage was high and I will have to pay. This is absurd."

- "My bill jumped to $627. This is outrageous! Look at Pepco's rate sheet. Rates are scheduled to increase another 20 percent this summer."

It is not clear if these soaring electricity bills were caused by cold weather, an unannounced rate change, or perhaps by a Pepco accounting glitch, but that is beside the point.

The point is that climate change legislation will lead to higher electricity prices — and consumer bills — and unlike the Moon Race, this will cause pain and suffering.

'Clean Coal' Through Carbon Capture and Storage

Whether you slap a carbon tax on coal-sourced electricity or cap-and-trade it, there won't be enough wind, solar and geothermal power (or nuclear power for that matter) to replace the coal this country uses anytime soon.

So we better get busy figuring out how to lower the carbon footprint of coal-burning power plants so coal remains viable in a carbon-constrained world.

Carbon capture and sequestration ("CCS") — in which CO2 emissions from a coal-burning power plant is captured (rather than emitted), and then pressurized and pumped into an underground cavern or reservoir for long-term storage — is our best hope for reducing CO2 emissions from coal-fired power plants.

The conventional wisdom, however, seems to be that CCS is unproven, that these underground reservoirs could leak and rerelease the trapped CO2, and thus CCS should be viewed as technology that is a long way off from being commercially viable. This is not accurate.

The petroleum industry has been placing pressurized CO_2 in depleted oil formations for at least forty years, in connection with so-called enhanced oil recovery ("EOR") operations.

In the typical EOR project, pressurized CO_2 sourced from naturally occurring deposits is pumped underground into a depleted oil formation to remove and recover residual petroleum.[3]

After all, economically viable petroleum values have been removed, the depleted oil formation is capped and abandoned, with the CO_2 trapped inside (assuming it is not recycled and reused in other EOR operations).

Most depleted oil formations can be expected to retain CO_2 without leakage for over 1,000 years. By definition, these formations have extremely effective trapping mechanisms (since the oil they held for millions of years would have migrated elsewhere had that not been the case).

Accordingly, depleted oil formations typically are attractive candidates for long-term CO_2 storage and pose minimal risks of leakage.

Given that the petroleum industry has been pumping CO_2 into underground formations for decades, why all the skepticism about the ability of coal-fired power plants to do the same?

There is no technological hurdle for coal-burning power plants to pressurize CO_2 emissions into a supercritical liquid form of CO_2, and we know from EOR operations that this liquid form of CO_2 will remain trapped in the underground caverns that used to hold oil.

There are literally tens of thousands of abandoned oil formations across the county, which are available for long-term storage of CO_2.

Indeed, long-term underground sequestration of "anthropogenic" (man-made) CO_2 is already being done commercially. For example, in 1998, Petro Source Carbon Company entered into a partnership with an affiliate of BP to construct an 82 mile, 10-inch CO_2 pipeline in West Texas known as the Val Verde Pipeline.

The pipeline transports CO_2 captured from five natural gas processing plants, avoiding CO_2 venting to the atmosphere. After capturing CO_2, it is dehydrated, compressed, and then transported through the pipeline to an existing CO_2 distribution system in the Permian Basin of West Texas where it is used in EOR operations.

Another example: in 2006, Shell and Statoil signed an agreement to work towards developing the world's largest project using CO_2 for EOR offshore. The concept involves capturing CO_2 from power generation and utilizing it to enhance oil recovery, resulting in increased energy production with lower CO_2 impact.

Thus, do we have the technology to store CO_2 underground for long periods safely? These examples suggest that the answer is “yes.”

That said, there clearly are other hurdles, other questions that must be answered before CCS can become commercially viable on a large scale.

Can we pressurize CO_2 for underground storage without driving the cost of coal-sourced electricity so high as to render it beyond the reach of ordinary citizens? Is the capacity of existing depleted oil formations sufficient to handle all CO_2 emissions from coal-fired power plants and, if so, for how long?

The answers to these (and other) questions will determine whether coal will be a successful transitional fuel, one that can keep our homes heated without adverse affects on the climate while we build renewable fuel capacity.

If the answers are yes, coal will facilitate our transition to renewable energy in a timeframe that may not satisfy Al Gore, but one which won’t leave Americans freezing in the winter. If the answers are no, we all better hope that good ‘ol Yankee know-how rides to our rescue — and soon.

--By Peter L. Gray, McKenna Long & Aldridge LLP

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[1] See www.wjla.com/news/stories/0209/59264.html.

[2] See www.myfoxwfld.com/newsvoicedc/2009/02/03/customers-outraged-over-rising-pepco-bills.

[3] Under normal temperature and pressure, CO_2 is in a gaseous state. When sufficiently compressed, however, CO_2 becomes a “dense phase gas” or a “supercritical fluid,” which exhibits characteristics of both a gas and a liquid. For example, it is able to move through solids like a gas, but is also capable of dissolving certain materials, as would a liquid.