

Coal: The solution to the energy crisis

OIL PRICE SHOULD BE MANAGED TO PROMOTE INVESTMENT IN CLEAN COAL PROJECTS



I don't know about you, but I find the daily obsession with the price of gasoline to be a particularly embarrassing portrayal of our national self-interest and lack of global understanding. Combine this with our "need" to buy those gas-guzzling SUVs and pickups and we have to look like real "bozos" in the eyes of the world.

We need to be talking about alternative technologies based upon the fuel we have: Coal.

According to the U.S. Energy Information Agency, we consume approximately 1,000 million short tons of coal per year, 90% of which is for electric power production. The detailed reserve estimate in 1997 was 507,738 million short tons in "demonstrated reserve base" and those that are estimated to be "economically recoverable." This is a 500 year supply, give or take, based upon current consumption patterns.

China has been reported to have 188,600 million short tons in reserves by the end of 2002, with an annual consumption of 1,500 million short tons; a 125 year supply. Their eggs don't even last that long! There are also estimates that China could have as much as 4,000,000 million short tons, as yet undiscovered.

The most consistent worldwide data for comparison purposes is provided by the Energy Information Agency and indicates that 80% of the 1,081,279 million short tons of "proved recoverable reserves" are located within the U.S. (270,000), Russia (173,000), China (126,000), India (93,000), Australia (90,000), Germany (72,000) and South Africa (55,000). Only Iran in the Middle East has coal at all, with a paltry 1,885 million short tons.

Ignoring the definition issues of demonstrated vs. economically proven, that's a lot of coal!

The technology does exist to use coal as the primary energy source for electric power generation and as a liquid fuel for transportation. The options fall under the Integrated Gasification and Combined Cycle technologies, or FutureGen as it is referred to by some. The capital investment is high, the efficiency is lower than we would like and, to be sure, there are environmental issues to be dealt with. But the technology is available (see p. 16 and 18).

One of the key opportunities toward improved efficiency and cost is the Air Separation Unit (ASU), required to provide the O₂ for the coal gasification process, but which can absorb 12-15% of the plant rated electric output. The industry is looking at Ion Transport Membrane technology as a high-temperature O₂ generator to eliminate the large cryogenic power requirement. The system is very much like a Solid Oxide Fuel Cell, except that the electrical circuit is not completed and O₂ is produced at approximately 950°C.

The combustor also has an important impact on plant configuration as well. The flame speed of hydrogen is such that it has been difficult to use the lean pre-mix approach to achieving low NO_x because of concerns over flashback. The consequence of this is that large quantities of the N₂ by-product from the ASU are recycled back to the combustor as diluent. This, in addition to the fuel that has four times less Btu, creates turbine flow mismatches and sizing issues. This mismatch is "managed" by the degree of integration of the ASU and its ability to pull air flow off the turbine.

What's missing is the investment climate for the multi-year, mega-billion dollar investments. Unfortunately, every time we get serious about using coal to replace oil imports, the price of oil drops and plans and plants get mothballed or scrapped. Oil prices of \$40 to \$60/bbl, or even \$100/bbl as some have suggested, will certainly trigger renewed interest in coal, but we need to provide some level of certainty or predictability to insure the adequate return on investment necessary to attract the participation of capital markets in these very long-term investments.

It would not be too difficult to establish an "oil price floor" that would provide a price support level consistent with these investment objectives. We used to talk about the "Gold Standard", but I think we are now on the "Oil" or "Btu Standard", and it is time that we started managing the price of oil like the world currency it has become. ■

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