**SHORT CRITIQUE OF FUTUREGEN”**

NPRE 470A

Homework Problem 1-3

Note: the DOE’s official FutureGen web-site (DOEFTGN) states “The Office of Fossil Energy is currently updating this section of the website. To learn more about FutureGen 2.0, please [click here](http://www.fossil.energy.gov/news/techlines/2010/10033-Secretary_Chu_Announces_FutureGen_.html)”. The hyper-link is just to a press-release about FutureGen 2.0. I have taken most of my information from the FutureGen Alliance web-site (FTGALL) and the Wikipedia article on FutureGen. (WKPFTGN).

According to the Wikipedia article on FutureGen, FutureGen 1.0 was axed because of cost overruns, the DOE pulling out from its increasing portion of its already majority share of funding, high risk management costs, and some private sector participants pulling out of the project. Others contend that FutureGen 1.0 was axed partially due to politics and the selection of an Illinois site over a Texas site. That is, selecting George W. Bush’s home state over future president Barack Obama’s home state, selecting Democratic Illinois versus Republican Texas. (However, the Mattoon area selected for FutureGen 1.0 is staunch Republican territory. Also, the Mattoon site was selected by the FutureGen alliance board, which was mainly composed of electric utility and coal industry representatives).

Intererstingly, the FutureGen Allliance in the FutureGen 2.0 overview (FTGOVRV) notes that the DOE has several IGCC (Integrated Gasification Combined Cycle, the technology for coal conversion in FutureGen 1.0) projects in its portfolio, but that it lacked an Oxy-combustion project. Oxy-combustion technology offers better prospect to retrofit existing coal-fired plants. FutureGen 2.0 is a less costly and less ambitious project aimed more at exploring the issues involved with and demonstrating the feasibility of carbon dioxide capture and sequestration (CCS) and less about how to generate electricity.

As for whether axing FutureGen1.0 and supporting its alternative of FutureGen2.0 are proper decisions, let me first discuss my views regarding “clean” coal, carbon dioxide capture and sequestration (CCS), and FutureGen 1.0.

FutureGen, whether version 1.0 or 2.0, is a fine project if the coal producing and coal consuming industries (like electric utilities) want to fund it. I could even support tax-credits to companies and donors supporting such research.

Carbon dioxide sequestration, like solar energy and various means of energy storage, is a technology that still needs at least a decade or two of development. Government money spent on carbon dioxide sequestration and new ways to combust coal are monies that governments cannot spend on less depletable primary energy options, like solar, that do not involve carbon. In other words, capable CCS will likely become available about the same time that we have capable energy storage for use with wind and solar sources.

Coal with CCS might best be viewed as a last-resort technology, to be used in the event that solar, wind, nuclear, and geothermal cannot meet our primary energy needs. If coal with CCS has merit, the fossil fuel producing and fossil fuel consuming industries have good motivation to fund this research. Government funds, on the other hand, might be better spent on research for the less depletable, non-carbon alternatives.

There is one area where I might justify (rationalize) some government funds regarding coal CCS. If we in any way adopt CCS, The EPA and/or other relevant regulatory agencies need to develop regulatory strategies for massive carbon dioxide storage sites and the shipment of carbon dioxide. This might justify funds being spent in partnership with the private backers on the CCS portion of the project. I can also justify some government funding in support of graduate and undergraduate education in energy science and engineering in conjunction with a FutureGen project.

FutureGen 2.0, though exploring a pure oxygen coal combustion steam boiler, fits better as a research project to “retrofit” existing coal fired power plants for CCS. Coal producing and coal combusting industries might be wise to support it. Being less ambitious and complex than FutureGen 1.0, FutureGen 2.0 might have a better chance for success with an earlier delivery date.

FutureGen 1.0 was oriented more to a new generation of coal burning power plants. Is this a wise approach? Is it too late to pursue a new generation of coal burning power plants?

The DOE did include hydrogen from coal gasification as a part of its 2002 carbon strategy (2002NVA). It was to start however, with hydrogen coming from its current primary source, natural gas reformation. Hydrogen from coal gasification was to come into play around 2020, in parallel with hydrogen from electrolysis. In this sense, a project like FutureGen 1.0 or 2.0 is part of the DOE’s plan. Whether it impedes DOE’s overall plan for a hydrogen economy depends on how well electrolysis using solar, wind, geothermal, nuclear or other non-carbon energy can do the job. If electrolysis succeeds, omission of hydrogen derived from coal gasification does not upset the time-scale.

REFERENCES

**DOEFTGN**: [www.fossil.energy.gov/programs/powersystems/futuregen/](http://www.fossil.energy.gov/programs/powersystems/futuregen/)

**FTGALL:** [www.futuregenalliance.org](http://www.futuregenalliance.org).

**FTGOVRV**: “FutureGen 2.0, the world’s first near zero emission coal-fueled power plant with CO2 storage”, October 28, 2010, www.futuregenalliance.org/media/FGen\_Overview\_101310\_v11.pdf.

**WKOFTGN**: en.wikipedia.org/wiki/FutureGen, December 26, 2010.

**2002NVA**: United States Department of Energy, “A national vision of America’s transition to a hydrogen economy – to 2030 and beyond”, National Hydrogen Vision Meeting, Washington DC, November 15-16, February 2002.